



# **Tier 2 Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements: Response to Comments**

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Engine Programs and Compliance Division  
Office of Mobile Sources  
U.S. Environmental Protection Agency

### *NOTICE*

*This technical report does not necessarily represent final EPA decisions or positions. It is intended to present technical analysis of issues using data which are currently available.*

*The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments which may form the basis for a final EPA decision, position, or regulatory action.*

RESPONSE TO COMMENTS DOCUMENT  
TIER 2 MOTOR VEHICLE EMISSION STANDARDS AND  
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## **TIER 2 MOTOR VEHICLE EMISSION STANDARDS AND GASOLINE SULFUR CONTROL REQUIREMENTS: RESPONSE TO COMMENTS**

### **INTRODUCTION**

The Tier 2 motor vehicle emission standards and gasoline sulfur control requirements establish requirements under Title II of the Clean Air Act ("CAA" or "the Act"). The rulemaking establishes emission standards for motor vehicles and control requirements to reduce sulfur levels in gasoline. The standards and the reduced sulfur levels are complementary measures that will reduce the serious adverse effects of NO<sub>x</sub> emissions and particulate matter on human health, visibility, ecosystems, and materials.

EPA proposed this regulation on May 13, 1999, at 64 FR 26004. The proposal announced the opportunity for written public comment until August 2, 1999. The proposal also provided notice of public hearings which were held on June 9 and 10 in Philadelphia, PA, June 11 in Atlanta, GA, June 15 in Denver, CO, and June 17 in Cleveland, OH. In addition, EPA published two notices providing supplemental information and opportunity to comment (see 64 FR 35112, June 30, 1999, and 64 FR 57827, October 27, 1999). Subsequently, EPA published a proposal on October 29, 1999 (64 FR 58472) to extend the Tier 2 program to include passenger vehicles in the 8,501-10,000 pounds GVWR range.

Complete transcripts of the public hearings and the full text of each comment letter, along with supporting information used in developing the regulation, are listed in Docket No. A-97-10 (and Docket A-98-32 for the passenger vehicles between 8,501-10,000 pounds GVWR). These dockets are available for public inspection and copying between 8:00 a.m. and 5:30 p.m., Monday through Friday, excluding government holidays, at Room M-1500, Waterside Mall, 401 M Street, S.W., Washington, D.C.

For Docket A-97-10, this document summarizes the written and oral comments submitted at the public hearings on June 9-10, 11, 15, and 17 (Docket Category IV-F), as well as the comment letters received during the initial public comment period (Docket Category IV-D), and records EPA's responses to those comments. For Docket A-98-32, this document only responds to those written comment in Docket Category IV-D that pertain specifically to the proposal regarding passenger vehicles between 8,501-10,000 pounds GVWR. In most cases in this document, EPA has listed all of the commenters who made a specific comment. In other instances, the Agency may have identified one or a representative number of commenters. The reader should note that many of the most significant comments are also addressed in the preamble for the final rule throughout this document and the responses in this document cross-reference the corresponding discussion in the preamble where appropriate.

The responses presented in this document and in the separate documents referred to above are intended (1) to augment the responses to comments that appear in the preamble to the final rule, or (2) to address comments not discussed in the preamble to the final rule. Although portions of the preamble to the final rule may be paraphrased in this and other documents where useful to add clarity to responses, the preamble itself remains the definitive statement of the basic rationale for the final rule.

EPA received nearly three hundred comment letters, as well as tens of thousands of e-mail and voicemail comments, regarding the proposed regulation, presenting more than two hundred issues. Commenters included gasoline refiners, marketers,



distributors, and retailers, automobile manufacturers and parts suppliers, industry research and trade groups, environmental organizations, and thousands of private citizens. A copy of each comment letter received is included in the rulemaking docket. A list of commenters and the EPA docket item number assigned to their correspondence is also included in the docket. All of the comments have been carefully considered, and where determined to be appropriate, changes have been made in the final regulation.

This document is divided into three parts. The first part comprises Issues 1 through 11, which address vehicle emission standards. The second part consists of Issues 12 through 22, which address gasoline sulfur. The third part, Issues 23 through 39, addresses program costs and benefits, technological feasibility, environmental impact, legal authority, issues related to passenger vehicles between 8,501-10,000 pounds GVWR, and other issues.

Comments within a particular Issue (or Subissue) are divided into specific comments (such as "Comment A" or Comment "A.1"), so that comments and responses on specific aspects of an Issue (Subissue) are grouped together. The lettering and numbering of these comments preserves the Agency's internal classification of points raised on a particular issue in the various comment letters. This approach allows for cross-referencing between responses to related comments. In certain places, comments have been consolidated in a logical manner for the Agency's response. Even in these consolidated comments, the comment identification in this document preserves the Agency's internal lettering and numbering identification system within an issue (for instance a comment may be identified as "Comments A, F, G, N, and S" if those individual comments have a single consolidated response).

Finally, note that in certain areas, EPA merged together or moved particular comments that initially had been assigned a particular letter or number identification. In a few cases, the Agency determined that the initial attempt to categorize a comment summary was erroneous, and thus the unique comment summary identifier should simply be deleted. In these cases, this document states that the unique identifier is "Reserved," and then the document indicates into which comment, if any, the Agency merged or moved the initial comment summary. For instance, under Issue 25.2, Comment A.2., the document states the following: "[Reserved] [See Issue 23.1.1.C]."

## **PART A: VEHICLE PROGRAM**

### **ISSUE 1: GENERAL COMMENTS - VEHICLES**

#### **Issue 1.1: Supports Vehicle Proposal**

**COMMENT A:** Generally supports the key parameters of the proposed Tier 2 program. Many of these commenters urge EPA to reject auto industry measures that weaken or delay the proposal. For certain commenters, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was over 80,000. **(Summary of Voice Mail and E-Mail Public Comments (IV-D-299) (Tabulation of EDF/Juno E-Mail Campaign), 20/20 Vision (IV-F-38), Alabama Dept. of Environmental Management (IV-D-201), American Lung Association (IV-D-167), p. 1-2, American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Denver) (IV-F-133), American Lung Association of Colorado (IV-F-900), American Lung Association of Gulfcoast Florida (IV-D-108), American Lung Association of NY (Philadelphia - Day 1) (IV-F-131), American Lung Association of Northern Ohio (IV-F-110), American Lung Association of Queens, Inc. (IV-F-40), American Lung Association of Santa Clara-San Benito (IV-D-106), American Lung Association of Virginia (IV-D-153), American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Appalachian Mountain Club (IV-D-251), Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), Blackbrook Audubon Society (IV-F-104), California Air Resources Board (IV-D-271), p. 1, Campaign on Auto Pollution (IV-F-44), Chicago Dept. of the Environment (IV-D-200), Children's Environmental Health Network (IV-D-205), City of Arlington (IV-D-204), City of Bedford (IV-D-207), City of Boulder (IV-F-85), City of Cedar Hill (IV-D-221), City of Euless (IV-D-104), City of Fort Collins (IV-F-125), City of Frisco (IV-D-89), City of Glen Heights (IV-D-280), City of Hurst (IV-D-141), City of Kennedale (IV-D-222), City of Lewisville (IV-D-282), City of Mesquite (IV-D-281), City of Plano (IV-D-170), City of Richardson (IV-D-220), City of Richland Hills (IV-D-223), Clean Air Network, et. al. (IV-F-95), Climate Solutions (IV-D-279), Colorado Automobile Dealers Assoc./National Automobile Dealers Assoc. (IV-F-123), Colorado Environmental Coalition (IV-F-87), Colorado Public Interest Group (IV-F-901), County of Dallas (IV-D-224), Delaware Valley Transit Users Group (IV-F-50), Department of Environmental Health, City and County of Denver (IV-F-62), Earth Day Coalition (IV-F-82), EcoCity Cleveland (IV-F-84), Environment Canada (Minister of the Environment) (IV-D-48), Environmental Defense Fund (IV-F-128), Environmentally Challenged Group (IV-D-83), Erin Kelly (Denver) (IV-F-133), Evangelical Environmental Network (IV-F-22), Frumpkin, Howard (Atlanta) (IV-F-132), Galik, D.S. (IV-F-79), Georgia Department of Natural Resources (IV-D-180), Gibson, David E. (IV-F-17), Glassroth, J., et. al. [587 individuals] (IV-D-227), Hester, Randy (Philadelphia - Day 1) (IV-F-131), Holding, Cory (Philadelphia - Day 2) (IV-F-131), Kauffman, W. (IV-D-212), Kitzhaber, J. A. (Gov. of Oregon) (IV-D-44), Kondas, L. (IV-F-66), Lancaster Greens (IV-F-29), League of Women Voters (IV-D-213), League of Women Voters - La Grange Area (IL) (IV-D-169), League of Women Voters of Maryland (IV-D-274), League of Women Voters of West Virginia (IV-D-275), Levy, Robin (Atlanta) (IV-F-132), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), MI Environmental Council (Cleveland) (IV-F-134), Manatee County Government (IV-D-45), Manufacturers of Emission Controls Association (IV-D-64), p. 3, Manufacturers of Emission Controls Association (IV-F-39), Michigan Environment Council (IV-F-105), Miller, C.R. (IV-F-63),**

Miller, D. (OH State Rep.) (IV-D-38), Mitsubishi Motors R&D of America, Inc. (IV-D-127), Montgomery Intercounty Connector Coalition, Inc. (IV-D-41), Montgomery Intercounty Connector Coalition, Inc. (Philadelphia - Day 1) (IV-F-131), Mountcastle, Brooks (Philadelphia - Day 2) (IV-F-131), NAACP (Atlanta) (IV-F-132), NC Dept. of Environment and Natural Resources (IV-D-262), NE Ohio Emapct Project (IV-F-80), NESCAUM (Philadelphia - Day 1) (IV-F-131), National Park Service (IV-D-135), Navistar International Transportation Corp. (IV-D-50), p. 1, New Hampshire Dept. of Environmental Services (IV-D-163), New Jersey Dept. of Environmental Protection (Philadelphia - Day 1) (IV-F-131), New Jersey Environmental Lobby (IV-D-261), New York Dept. of Environmental Conservation (IV-D-43), Nissan North America, Inc. (IV-D-125), p. 2, North Central Texas Council of Governments (IV-D-90), Office of the Mayor of Saginaw (IV-D-78), Ohio Environmental Council (Cleveland) (IV-F-134), Ohio Local Air Pollution Control Officials Association (IV-F-97), Ohio Lung Association (Cleveland) (IV-F-134), Oregon Department of Environmental Quality (IV-F-57), Oregon (Office of the Governor) (IV-D-27), Oregonians for Clean Air (IV-D-202), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 1,3, Pete Maysmith (Denver) (IV-F-133), Phan, Kimmy (Atlanta) (IV-F-132), Public Interest Law Center of Philadelphia (IV-D-42), Public Interest Law Center of Philadelphia (IV-F-30), Public Interest Law Center of Philadelphia (Philadelphia - Day 2) (IV-F-131), Puget Sound Air Pollution Control Agency (IV-D-138), Ray, C. (IV-F-101), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), Rohm and Haas, Agricultural Chemicals Division (IV-F-25), Rooney, J. Astra (Philadelphia - Day 2) (IV-F-131), SC Coastal Conservation League (IV-D-260), SC Department of Health and Environmental Control (IV-D-56), p. 1-2,4, STAPPA/ALAPCO (IV-D-67), p. 1-3, STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Scott, Kevin (Philadelphia - Day 1) (IV-F-131), Scott, Kevin (Philadelphia - Day 2) (IV-F-131), Sierra Club (IV-D-46), Sierra Club (IV-F-3), Sierra Club (Philadelphia - Day 1) (IV-F-131), Sierra Club (Philadelphia - Day 2) (IV-F-131), Sierra Club, Ohio Chapter Energy Committee (IV-D-101), Sierra Club, PA Chapter (IV-D-215), Sierra Club, Southwest Region (Denver) (IV-F-133), Smith, S. (IV-D-19), Spokane Tribal Natural Resources (IV-D-95), State of Missouri Dept. of Natural Resources (IV-D-192), Strauss, Sharon (Philadelphia - Day 1) (IV-F-131), Sunday, D. (IV-F-108), Tarrant County Commissioners Court (IV-D-219), Tennessee Environmental Council (Atlanta) (IV-F-132), Texas Natural Resource Conservation Commission (IV-D-232), The Hopi Tribe (IV-D-88), Town of Flower Mound (IV-D-173), Township of Springfield (IV-D-105), Trepal, C. (IV-F-109), U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (IV-F-55), U.S. Public Interest Research Group (Cleveland) (IV-F-134), Udall, M. (U.S. Rep.) (IV-D-210), Union of Concerned Scientists (IV-D-195), p. 1, Union of Concerned Scientists (IV-F-88), Washington State Dept. of Ecology (IV-D-175), White, Randall F. (IV-F-10), Wisconsin Transportation Builders Association (IV-D-185) [Docket Items for Multiple Individuals: International Center for Technology Assessment (IV-D-182), Multiple Private Citizens (IV-D-1, 2, 6, 7, 9, 12, 15, 16, 22-31, 33, 144, 145, 160, 161, 172, 184, 230, 233, 234, 247, 248, 263, and 267-269), State PIRG Petitions (IV-D-241 and 249), Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), Voicemail Transcript Reports (IV-D-34, 35, 235, 237, and 238)]

**RESPONSE:** A large number of commenters expressed general support for our proposed program. Many of them specifically urged rejection of measures that would weaken or delay the program and/or support the comprehensive vehicle/fuel approach to the rule. After consideration of all comments, we are finalizing a comprehensive

program that in most respects matches the proposed program. As described elsewhere in the rule, we concluded that the program should include an interim period with less restrictive requirements than those of the final program, as proposed. At the same time, we designed the proposed interim program to achieve partial emission reductions during the interim years; the interim program of this final rule also has this characteristic. We believe the resulting overall program will achieve the necessary emission reductions, on a schedule that achieves them when they are needed.

**COMMENT B:** The implementation of the Tier 2 standards is necessary to help ensure the attainment of the NAAQS for ozone. **(Environmental and Energy Study Institute (IV-D-283), Florida Department of Environmental Protection, Div. of Air Resource Management (IV-F-16), Illinois Environmental Protection Agency (IV-D-133), International Center for Technology Assessment (IV-D-122), p. 2, League of Women Voters (Philadelphia - Day 2) (IV-F-131), Maine Dept. of Environmental Protection (IV-D-177), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 1, 3, Metro Washington Air Quality Committee (IV-D-79), NC Dept. of Environment and Natural Resources (IV-D-262), National Conference of State Legislatures (IV-D-214), New Jersey Dept. of Environmental Protection (Philadelphia - Day 1) (IV-F-131), NESCAUM (IV-D-130), p. 1-3, Ozone Transport Commission (IV-D-112), p. 2, Ozone Transport Commission (IV-D-99), Ozone Transport Commission (IV-F-4), Ozone Transport Commission (IV-F-4), Pennsylvania Automotive Association (Philadelphia - Day 1) (IV-F-131), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), Senate Hearing Materials (IV-D-229), Sen. Lieberman, p. 1; Sen. Moynihan, p. 1, State of Connecticut, Dept. of Environmental Protection (IV-F-2), State of Wisconsin (IV-D-166), United Automobile Workers, International Union (IV-D-93))**

**RESPONSE:** Several commenters stated that the emission reductions of the program are needed to ensure attainment of the ozone and/or PM NAAQS standards. We agree with this view, as described in the preamble to this final rule and elsewhere in this Response to Comments document. (See Issue 27 later in this document.)

**COMMENT C:** Endorses the comprehensive approach of treating the emission controls and fuels as a system, although some of these commenters disagree with the specific elements of EPA's "system" proposal. **[Representative list of commenters: Alliance of Automobile Manufacturers (IV-D-115), p. i, 12, American Institute of Chemical Engineers (IV-D-242), American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), American Petroleum Institute (IV-D-114), p. 1, Engine Manufacturers Association (IV-D-71), p. 2, International Center for Technology Assessment (IV-D-122), p. 2, Nissan North America, Inc. (IV-D-125), p. 2, Oregon (Office of the Governor) (IV-D-27), STAPPA/ALAPCO (IV-D-67), p. 1, U.S. Department of Energy (IV-D-121), p. 1]**

**RESPONSE:** See response to Issue 1.1, Comment A.  
**Issue 1.2: Opposes Vehicle Proposal**

**COMMENTS A, D, and G:** There has been a significant reduction in vehicle emissions in recent years -- the implementation of the Tier 2 program is unnecessary. **(AAA Ohio Motorists Association (IV-F-72), Alliance of Automobile Manufacturers (IV-D-115), p. 44)** The proposal will act as a disincentive for people to replace older, higher emitting vehicles by driving up new car prices. **(Roman, T. (OH State Rep.) (IV-D-107))** EPA has

not shown that further emissions reductions are necessary. **(U.S. Chamber of Commerce (IV-D-142))** Generally opposes the proposal. These include multiple individuals that were docketed under single docket items with other individuals. The total number of persons voicing general opposition in these docket items was approximately 200. **(International Center for Technology Assessment (IV-D-182), Multiple Private Citizens (IV-D-7, 144, 160, 247, 263 and 267), Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), Voicemail Transcript Reports (IV-D-34, 35, and 237))**

**RESPONSE:** Many commenters expressed opposition to specific elements of the proposed program or to the program as a whole. In response to those commenters that believe that the emission reductions that would be achieved are unnecessary, we believe the opposite: the emission reductions that the proposed program would achieve are indeed needed for ozone and PM attainment. A few commenters also expressed concern that increases in ozone may occur in some areas because of the NO<sub>x</sub> reductions of the Tier 2 program. Responses to each of these concerns are found under Issue 27 in this document.

**COMMENT B:** There has been a lack of public notice of the hearings and implementing additional regulations without adequate public discussion would fail to provide an impartial assessment of the situation. **(Benjamin, A. W. (Ohio State Rep) (IV-D-77), Roman, T. (OH State Rep.) (IV-D-107))**

**RESPONSE:** Regarding the concern about whether EPA had provided adequate opportunity for public comment, we believe that the opportunity for public input was significant. For example, we put the entire proposal and several fact sheets on the Internet well before the rule appeared in the Federal Register, we held 5 days of public hearings in 4 cities around the country, and we kept the comment period open for nearly three months and reopened the comment period on certain issues for two additional months. The adequacy of the opportunity for public input is reinforced by the fact that over 250 individuals and organizations testified at the hearings, many of them private citizens, and many thousands sent post cards, letters, and e-mail and voice mail messages expressing opinions on the proposed program. This level of involvement by stakeholders in this rule is unprecedented for motor vehicle regulations.

**COMMENTS C and F:** The proposal leaves no leeway for states to develop programs and policies to address air pollution and instead imposes a one-size-fits-all solution. **(Roman, T. (OH State Rep.) (IV-D-107))** Another commenter states that a national standard may reduce per-vehicle costs, but it does so by spreading capital, research and development, and production costs to those who don't benefit from them. Thus, while it may be that the proposal could reduce costs to consumers in California and the OTAG region (due to economies of scale), this is only because consumers in other regions are forced to pay for vehicle attributes they do not want or need. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 18)**

**RESPONSE:** Another commenter expressed concern that the proposed gasoline sulfur program leaves no leeway for independent action by states. This is not true. States are not barred from individual action. However, the Clean Air Act specifically prevents individual states from promulgating different standards for any fuel characteristic that EPA has regulated unless the state can show the need for such further standards. Similarly on the vehicle side, one commenter points out that average vehicle costs of the

program are reduced because all passenger cars and light trucks sold nationwide are covered by the program, including areas that are perceived to need less emission reductions than others. Vehicles, however, are by design mobile sources that routinely move, either temporarily or permanently, to various places throughout the United States that may be in attainment or nonattainment for various pollutants. Limiting geographical differences in vehicle emission standards is an important public policy goal and is important for the effectiveness of motor vehicle regulations. In addition, there are benefits to cleaner vehicles in all regions of the country, even where ozone is less of a problem (see Section III of the preamble and Chapter III of the RIA).

**COMMENT E:** By focusing on its expectations regarding the availability of technologies, EPA does not adequately address cost, safety, or energy impacts, as required by the CAA. In particular, there appear to be real tradeoffs between fuel efficiency and NO<sub>x</sub> emissions, and EPA's proposal, with its stringent emission limits and short lead time, is likely to preclude promising fuel efficient technologies (such as GDI engines) from competing in the U.S. market. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 7-8)**

**RESPONSE:** Another reason given for opposing the program was the belief that the proposed standards will threaten the commercial viability of some technologies. Also, some commenters said that we did not adequately address the issues of cost, safety, and energy policy that they believe sometimes compete with emission control goals. See responses in Issues 2 and 26 below.

### Issue 1.2.1: Proposal Too Stringent

**COMMENTS A and D:** The Tier 2 standards are not necessary to attain or maintain the NAAQS for any of the criteria pollutants. (**DaimlerChrysler (IV-D-59), p. 2**) The Tier 2 standards may not be necessary or appropriate in achieving the NAAQS, due to the potential for NO<sub>x</sub> disbenefits. [see also Issue 27.4, Comment B.2-.3] (**McIntosh, D. (IV-D-252), p. 2**) Also, the proposed Tier 2 vehicle standards may not be promulgated on the basis of the revised ozone or PM NAAQS that the D.C. Circuit held invalid in ATA. In the context of this decision, EPA's assertion in the SNPRM that "the Court's opinion does not address EPA's determination that the 1-hour ozone standard fails to protect health" is in error. The Court chose not to address that contention only because it had already vacated the NAAQS on three other grounds (i.e. violated the Constitution and the CAA, and could possibly harm public health). Until EPA considers all of the health effects of the revised ozone and PM NAAQS (i.e. possible disbenefits), reliance on those standards would be arbitrary, capricious, and potentially harmful to public health. The Tier 2 standards will have no significant impact on CO or PM<sub>10</sub> nonattainment and EPA will act arbitrarily if it attempts to justify more stringent vehicle controls for these pollutants. EPA's proposed standards are also not necessary to attain or maintain any other NAAQS. The Tier 2 standards are not needed to attain the 1- hour ozone NAAQS since EPA has overestimated the extent of the non-attainment problem and the effectiveness of NO<sub>x</sub> control as a solution. [See also Issue 27.4] (**General Motors Corporation (IV-D-209), vol. 1, p. 5-19, 25-29**)

**RESPONSE:** Many commenters expressed opposition to specific elements of the proposed program or to the program as a whole. In response to those commenters that believe that the emission reductions that would be achieved are unnecessary, we believe the opposite: the emission reductions that the proposed program would achieve are indeed needed for ozone and PM attainment. A few commenters also expressed concern that increases in ozone may occur in some areas because of the NO<sub>x</sub> reductions of the Tier 2 program. Responses to each of these concerns are found under Issue 27 in this document.

Also, regarding comment 1.2.1.(A), as discussed in several places in this and other documents, EPA has not relied on the 8-hour ozone NAAQS or the PM<sub>2.5</sub> NAAQS in promulgating this rule. EPA discusses in detail in other areas of this and other documents 1) why further reductions are needed to attain or maintain the 1-hour ozone NAAQS and the preexisting PM<sub>10</sub> NAAQS, and 2) why the Tier 2 program is needed and cost-effective, compared to alternative means of attaining or maintaining the these NAAQS, as well as the NAAQS for carbon monoxide.

**COMMENT B:** EPA may implement the proposed standards under section 202(i) only if they are "needed" to meet the NAAQS, and the health based provisions in section 202(a) cannot be used to circumvent the requirements of 202(i). Congress has made clear that the standards promulgated under section 202(a) may not be more strict than necessary to permit attainment and maintenance of a NAAQS. Section 202(b)(1) imposes a number of limitations on the revision of emissions standards under section 202(a)(1) and provides that EPA may revise the standards only as "needed to protect public health or welfare." Section 202(a) has the same threshold standard and purpose as section 109: to reduce pollution "which may reasonably be anticipated to endanger public health or welfare." Therefore a standard that is strict enough for section 109 (which does not require consideration of costs) is strict enough for section 202(a) and to interpret the

CAA any other way would be inconsistent with both the statute as a whole and the history of the statute. In addition, the lead fuel additive standards are plainly distinguishable from the proposed standards (since they were based on the section 211 provision that is limited to fuel additives) and cannot be used as additional justification. GM provides significant discussion and legal analysis regarding the assertion that if one level of public health protection is appropriate for section 109 (and thus section 202(i)), EPA cannot at the same time find that a stricter level is appropriate for section 202(a). GM provides some historical information in the context of the CAA and makes reference to several subsections of 202(a), (b), and (i), as well as the following: *American Trucking Ass'n v. EPA*, 175 F.3d 1027, 1040 (D.C. Cir. 1999); *Train v. NRDC*, 421 U.S. 60, 79 & n.16 (1975); *Lexecon Inc. v. Milberg Weiss Bershad Hynes & Lerach*, 118 S. Ct. 956, 962 (1998); 2A C. Sands, *Sutherland on Statutes and Statutory Construction*- Section 51.2 (4th ed. 1973); *Virginia v. EPA*, 108 F.3d 1397, 1413 (D.C. Cir. 1997); and *Small Refiner Lead Phase-Down Task Force v. EPA*, 705 F.2d 506 (D.C. Cir. 1983). **(General Motors Corporation (IV-D-209), vol. 1, p. 2, 6-11)**

**RESPONSE:** Regarding comment 1.2.1.(B) above, EPA disagrees with the commenter's contention that we are attempting to circumvent the requirements of section 202(i) by promulgating our standards for LDT2s and other LDTs under section 202(a). It is clear from the language of the statute that section 202(i) applies solely to light-duty vehicles and LDT1s. The commenter, in fact, admits that LDT2s, -3s and -4s are covered under different sections of the Act, not section 202(i). EPA's reference to sections 202(a)(1), (a)(3) and (b) is simply an acknowledgment, apparently shared by the commenter, that its decision regarding the appropriateness of new standards for LDT2-4s must not be made under section 202(i), but instead under the subsections of section 202 that apply to such vehicles.

The commenter claims that standards promulgated under section 202(a) are restricted to what is needed to attain and maintain a NAAQS. Yet nothing in section 202(a) so restricts it. Section 202(a) permits EPA to promulgate standards "applicable to the emission of any air pollutant from any class or classes of new motor vehicles or ... engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." On its face, this provision does not tie such standards to the attainment and maintenance of a NAAQS. Indeed, there are numerous types of air pollution regulated under the Act that are not covered by the section 109 NAAQSs. For example, EPA has authority under section 112 to regulate 189 "hazardous air pollutants," ("HAPs") and may add to the list of HAPs any "pollutants which present, or may present,...a threat of adverse human health effects ... or adverse environmental effects." The Clean Air Act also regulates visibility (section 169A and 169B), acid rain (Title IV) and depletion of stratospheric ozone (Title VI). All of these air pollution concerns can, by any measure, be "reasonably anticipated to endanger public health or welfare."

Further, it is clear from the language of the statute that section 202(a) was not intended to be restricted to meeting the NAAQSs. As commenters note, section 202(i) specifically references attainment and maintenance of the NAAQS as a criterion for regulations. What this evidences, however, is that Congress was well aware of its ability to confine EPA's review to NAAQS attainment, and has so confined EPA when it wished to. However, unlike section 202(i), section 202(a) has no such restriction; nor does section 202(b)(1)(C), which commenters cite, which discusses EPA's ability to revise certain standards "as needed to protect public health or welfare," which is not restricted to attaining or maintaining a NAAQS.



Similarly, as the commenter notes, section 202(a) was enacted in 1965, prior to section 109 being added to the Act. It therefore had to be a source of authority independent from section 109 for determining the appropriateness of promulgating motor vehicle standards. When Congress added sections 108 and 109 in 1970, Congress could have revised section 202(a) to restrict its review to meeting and maintaining NAAQSs, but Congress did not so revise section 202(a), preserving the independent authority provided in 1965.

Section 202(l) also makes clear that section 202(a) is not restricted to NAAQSs. Under section 202(l), EPA is required to promulgate standards under subsection (a), containing reasonable requirements to control hazardous air pollutants from motor vehicles and fuels. If section 202(a) were restricted to NAAQS-related standards, then EPA could not promulgate standards "under section 202(a)" regulating hazardous air pollutants, which are not NAAQS related pollutants.

The commenter notes that the language in section 109 (actually sections 108 and 109) is similar to that in section 202(a). But that is also true, to some extent, with regard to other portions of the Act under which we regulate other pollutants. See section 112. The courts have held that EPA may regulate non-NAAQS pollutants in promulgating standards controlling emissions that "may reasonably be anticipated to endanger public health or welfare." See Engine Manufacturers Assn. v. EPA, 88 F.3d 1075, 1099 (D.C. Cir. 1996).

The commenter notes that this interpretation could allow EPA to promulgate more stringent standards for LDT2s, -3s, and -4s than for LDVs and LDT1s, at least under section 202(i). EPA has not done that in this rulemaking, so the comment is moot. In any case, EPA notes that section 202(i) limits EPA's rulemaking authority under section 202(a) for a specific subset of motor vehicles, LDVs and LDT1s. For other light duty trucks, as well as heavy duty vehicle and engines, the limits of section 202(i) are not applicable. It is therefore possible that under appropriate circumstances EPA would have authority under section 202(a)(1) or (3) to establish standards for other light duty trucks that are different, either more or less stringent, than those authorized under section 202(i).

Since there are different statutory requirements that apply to different subsets of motor vehicles, as well as the possibility of different factual and other circumstances, it is not illogical to think that different standard might result. For example, the language of the statute indicates that Congress indeed intended that EPA's regulation of heavy duty vehicles, including LDT3s and -4s, would be comparatively stringent, compared to section 202(i), because Congress explicitly required such standards to "reflect the greatest degree of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology." However, as noted above, this comment is moot as EPA has not adopted different standards for LDT 2, 3, and 4s, and heavy duty vehicles. EPA applied the statutory provisions specifically applicable to these groups of motor vehicles using basically a similar and consistent approach as it did for the motor vehicles subject to section 202(i).

The commenter also states that the air quality test for promulgating a standard under section 109 is as or more stringent than the test under section 202(a), so the air quality need criteria under section 202(a) should not be more stringent than that under section 109. As discussed above, EPA believes that consideration of air quality need under

section 202(a) is not limited to consideration of pollutants for which a NAAQS has been established. In this rulemaking EPA did consider air quality need under section 202(a) with respect to emissions that are related to a pollutant for which a NAAQS has been set. This was the primary focus of EPA's consideration of air quality; however, EPA also took into account the impact of these emissions on air quality problems for which no NAAQS has been set, such as air toxics.

Where EPA did focus on NAAQS related emissions, its consideration of air quality for purposes of need for reductions was limited to consideration of need for further reductions to attain and maintain the 1-hour ozone NAAQS and the preexisting PM10 NAAQS. EPA did not in this rulemaking use its section 202(a) authority to achieve emissions reductions aimed at achieving air quality levels more protective than the NAAQS. As such, the commenters objections are moot. In any case, EPA does not agree that the language of section 109 and the level of air quality control established under that section necessarily binds it in acting under section 202(a). As noted above, that is not relevant to this rulemaking.

The commenter also is incorrect in asserting that EPA incorrectly relied on section 202(a)(3)(A) in promulgating its standards for HLDTs. Its reading of the legislative history of section 202(a)(3) is faulty. First, though precursors to section 202(a)(3)(A) appeared in the 1977 Act, the section was significantly revised and section 202(a)(3)(A) as it currently reads first appeared in the 1990 Amendments. Second, nothing in the text of the statute indicates that section 202(a)(3)(A) is applicable solely to standards already in place. In fact, the addition of such a section in 1990, without any reference to preexisting standards or any time limit on its applicability, would indicate that this section is controlling for future standards. Any other interpretation would ignore the specific language in the statute. Even the language of section 202(a)(3)(B), the section that the commenter refers to as controlling heavy duty standards, shows that section 202(a)(3)(A) is intended to apply to heavy duty standards after the promulgation of the 1990 Amendments. The subsection allows EPA, based on data related to heavy duty air pollutants and taking cost into account, to revise heavy-duty standards promulgated under, or before the date of, the enactment of the Clean Air Act Amendments of 1990 (or previously revised under subparagraph (a)(3)(B)). The import of the reference to standards promulgated under the 1990 Amendments (which are distinguished from standards promulgated under subparagraph (a)(3)(B)) is that Congress expected that standards for heavy-duty vehicles would, following the enactment of the 1990 Amendments, be promulgated generally under subparagraph (a)(3)(A).

Finally, it is clear from the legislative history of the 1990 Amendments that section 202(a)(3)(A), far from being merely applicable to the then-existing standards, was intended to be the primary vehicle for promulgating standards for heavy duty vehicles and engines in the future. See Statement of Senate Managers, Legislative History, at 886-887 ("The House amendment [for heavy-duty trucks]... authorizes the Administrator of EPA to set technology-forcing emission standards, considering cost, energy, and safety factors....The conference agreement adopts the House provisions."); H.R. 101-490, U.S. House of Representatives, Committee on Energy and Commerce, at 309, Leg. Hist. at 3333 (The House amendment "requires the Administrator to set technology-forcing emission standards, considering cost, energy and safety factors. ... It is the intent of the Committee that current standards for heavy-duty vehicles and engines remain in effect, until such standards are superceded by more stringent standards promulgated under the new provisions.") In fact, section 202(a)(3)(B) is given barely any notice in the legislative history, despite the fact that it was part of the amendments for a significant

time prior to passage. This subsection merely ensures that the Agency would not be forced to promulgate technology forcing standards under section 202(a)(3)(A) past the time that such standards were appropriate, based on air quality information. As indicated elsewhere in this rule, there is clear evidence that there will be air quality benefits from the standards promulgated in this rule for HLDTs. Therefore, it is appropriate for EPA to promulgate these standards under section 202(a)(3)(A).

EPA notes that whether the standards for LDT2 are properly promulgated under the requirements of section 202(a) or the very similar requirements in section 202(b)(1)(C), the standards promulgated in this rule clearly meet these requirements.

**COMMENT C:** The proposed Tier 2 program risks the commercial viability of diesel fuel engine technology, resulting in the potential loss of many of the benefits of this technology. **(Cummins Engine Company (Atlanta) (IV-F-132), Detroit Diesel Corporation (Atlanta) (IV-F-132), Engine Manufacturers Association (Atlanta) (IV-F-132))**

**RESPONSE:** Another reason given for opposing the program was the belief that the proposed standards will threaten the commercial viability of some technologies. Also, some commenters said that we did not adequately address the issues of cost, safety, and energy policy that they believe sometimes compete with emission control goals. See responses in Issue 2 and 26 below.

**Issue 1.2.2: Proposal Too Lenient**

**COMMENT A:** The proposed Tier 2 program should be strengthened to prevent unnecessary delays and to avoid exacerbating the existing loopholes for larger vehicles. **(American Lung Association of Northern Ohio (IV-F-110), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Goldin, L.J. (IV-D-39), Ohio Public Interest Research Group (IV-F-98))** Urges OTC states to adopt the CA LEV II program as a backstop in the event EPA does not strengthen the Tier 2 tailpipe standards. **(American Lung Association, et. al. (IV-D-98))**

**RESPONSE:** See response to Issue 1.3, Comment F.

### **Issue 1.3: Coverage**

**COMMENT A:** EPA should apply the Tier 2 standards to all passenger vehicles by 2007, regardless of weight. (**American Lung Association (Philadelphia - Day 1) (IV-F-131), Gutierrez, R. (IV-D-55), Manatee County Government (IV-D-45), Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 2, SC Coastal Conservation League (IV-D-260), Sierra Club (IV-F-3)**) For certain commenters, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was over 1600 [final number may need to be adjusted for mass, form emails not in docket]. (**Multiple Private Citizens (IV-D-1, 2, 6, 7, 9, 12, 15, 16, 22, 27, 29-31, 33, 144, 145, 160, 161, 172, 184, 230, 233, 234, 247, 248, 263, 267, and 269), State PIRG Petitions (IV-D-241 and 249), Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), Voicemail Transcript Reports (IV-D-34 and 35)**)

**RESPONSE:** See response to Issue 1.3, Comment F.

**COMMENT B:** SUVs above 8500 lbs should be regulated as well. (**American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of Northern Ohio (IV-F-110), Chicago Dept. of the Environment (IV-D-200), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Cohen, David L. (IV-F-23), Colorado Public Interest Group (Denver) (IV-F-133), Cuyahoga County Planning Commission (IV-F-83), EcoCity Cleveland (IV-F-84), Environmental Defense Fund (IV-D-174), p. 13-14, Environmental Health Watch (IV-F-81), Frank, Mike (IV-F-913), Fund for Public Interest Research (Atlanta) (IV-F-132), GA House of Representatives (Atlanta) (IV-F-132), Glassroth, J., et. al. [587 individuals] (IV-D-227), Goldin, L.J. (IV-D-39), Kauffman, W. (IV-D-212), Kostmeyer, Peter (IV-F-27), League of Women Voters - La Grange Area (IL) (IV-D-169), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Mason, P. (IV-F-70), Minott, J. (IV-F-7), NJ Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), National Environmental Trust (IV-F-26), Ohio Public Interest Research Group (IV-F-98), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), Puget Sound Air Pollution Control Agency (IV-D-138), Sierra Club (IV-F-14), Sierra Club (Philadelphia - Day 1) (IV-F-131), Sierra Club - Northeastern OH (Cleveland) (IV-F-134), Sierra Club, Maryland Chapter (IV-F-53), Sierra Club, PA Chapter (IV-D-215), Sierra Club, Utah Chapter (IV-F-116), Tennessee Environmental Council (Atlanta) (IV-F-132), U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Cleveland) (IV-F-134)**)

**RESPONSE:** See response to Issue 1.3, Comment F.

**COMMENT C:** EPA should apply the Tier 2 standards to SUVs between 8,500 and 10,000 lbs GVWR. (**American Lung Association (IV-D-167), p. 6, Appalachian Mountain Club (IV-D-251), Bell, S. (IV-F-89), League of Women Voters (IV-D-213), League of Women Voters of Maryland (IV-D-274), League of Women Voters of West Virginia (IV-D-275), Maine Dept. of Environmental Protection (IV-D-177), Mavec, Ken (Cleveland) (IV-F-134), New Hampshire Dept. of Environmental Services (IV-D-163), Ohio Local Air Pollution Control Officials Association (IV-F-97), Ozone Transport Commission (IV-D-112), p. 2, SC Department of Health and Environmental Control (IV-D-56), p. 3-4, STAPPA/ALAPCO (IV-D-67), p. 8; att. 2, p.3, STAPPA/ALAPCO (IV-F-117),**

**STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Texas Fund for Energy and Environmental Education (IV-D-87), U.S. Public Interest Research Group (IV-F-55), Union of Concerned Scientists (IV-D-195), p. 1, 8) (See other letters listed under Comment C.1 that follow.)**

**RESPONSE:** See response to Issue 1.3, Comment F.

**COMMENT C.1:** Another alternative would be to use EPA's authority to set standards for vehicles between 8,500 and 14,000 to discourage manufacturers from adding weight to these vehicles to escape the Tier 2 requirements. Another option suggested by one commenter is to classify vehicles from 8,500 to 10,000 GVWR based on curb weight plus 300 pounds, since non-commercial owners rarely carry a full load. **(American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Environmental and Energy Study Institute (IV-D-283), International Center for Technology Assessment (IV-D-122), p. 2-4, Massachusetts Dept. of Environmental Protection (IV-D-137), p. 4, Physicians for Social Responsibility (IV-D-194))**

**RESPONSE:** See response to Issue 1.3, Comment F.

**COMMENT D:** EPA should address the potential for vehicle migration since manufacturers may add weight to certain LDTs in order to exempt these vehicles from the Tier 2 standards. **(Environmental Defense Fund (IV-D-174), p. 13-14, Ozone Transport Commission (IV-D-112), p. 2, Union of Concerned Scientists (IV-D-195), p. 1) (See other letters listed under Comment D.1 that follow.)**

**RESPONSE:** See response to Issue 1.3, Comment F.

**COMMENT D.1:** An ideal restriction would prevent migration of LDTs above the limiting criteria, but would not impact vehicles with legitimate needs to be outside, but close to, the LDT definition. This may be complicated, because many LDTs currently have derivatives or corresponding models that are over 8,500 GVWR. **(American Lung Association (IV-D-167), p. 6-7, STAPPA/ALAPCO (IV-D-67), p. 8)**

**RESPONSE:** See response to Issue 1.3, Comment F.

**COMMENT E:** EPA should not apply the Tier 2 standards to vehicles greater than 6,000 lbs GVWR since it would be inconsistent with the intent of both Congress and the CAA. **(DaimlerChrysler (IV-D-59), p. 4)**

**RESPONSE:** See response to Issue 1.3, Comment F.

**COMMENT F:** EPA should not consider regulating vehicles between 8,500 and 10,000 lbs GVWR under the Tier 2 rulemaking. **(American Trucking Associations (IV-D-70), p. 3-4, Cummins Engine Company, Inc. (IV-D-132), p.19)**

**RESPONSE:** Many commenters expressed opinions on the appropriate set of vehicles that should be covered by the program and/or by when. We discuss our position on the

inclusion of heavy light-duty trucks (those above 6,000 lbs GVWR) under Issue 2, below. We discuss our position on the inclusion of medium duty passenger vehicles greater than 8,500 lbs GVWR under Issue 39, below, and our position on the inclusion of diesel vehicles under Issues 2, 26, and 30. And we discuss the timing of the interim vehicle program under Issues 4, 5, and 6, below.

## ISSUE 2: CORPORATE AVERAGE STANDARDS

### Issue 2.1: Single versus Multiple Standards

#### Issue 2.1.1: Generally

**COMMENT A:** Supports Tier 2 standards as fuel-neutral. (American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Appalachian Mountain Club (IV-D-251), California Air Resources Board (IV-F-126), Department of Environmental Health, City and County of Denver (IV-F-62), Engine Manufacturers Association (Denver) (IV-F-134), Environmental Defense Fund (IV-D-174), p. 14, Environmental Defense Fund (IV-F-128), Erin Kelly (Denver) (IV-F-133), Maine Dept. of Environmental Protection (IV-D-177), Mavec, Ken (Cleveland) (IV-F-134), New Jersey Environmental Lobby (IV-D-261), Nissan North America, Inc. (IV-D-125), p. 2, Ozone Transport Commission (IV-D-112), p. 2-3, Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 2, Physicians for Social Responsibility (IV-D-194), Plant, T. (IV-F-60), STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), Sierra Club, Southwest Region (Denver) (IV-F-133), State of Wisconsin (IV-D-166), Union of Concerned Scientists (IV-D-195), p. 8, Wisconsin Transportation Builders Association (IV-D-185)) STAPPA/ALAPCO and ALA provide additional discussion regarding the importance of regulating diesels under the same standards as all other vehicles, since the number of diesel engines in proportion to the entire fleet is likely to rise in the future. EPA should avoid increased exposure to PM and other pollutants that would arise from a larger diesel fleet by applying the same standards to all vehicles regardless of fuel. (American Lung Association (IV-D-167), p. 3-4, STAPPA/ALAPCO (IV-D-67), p. 4-5; att. 2, p. 3)

**RESPONSE:** Our final rule applies the same standards to diesel and gasoline-fueled vehicles, and to alternative-fueled vehicles as well. EPA does not believe that it is required to have less stringent standards for diesel fueled vehicles in this rule. Currently, the market share of diesels under 8500 pounds GVW is approximately one-half of one percent. Although our final Tier 2 standards are tight, we believe that improved-technology diesels will be able to meet them if low sulfur diesel fuel is made available. Under our final Tier 2 program structure, diesel vehicle manufacturers will have until model year 2009 to comply with the standards for LDT3s and 4s. We recognize that the PM values associated with the highest bins of the interim HLDT program may be construed as accommodating diesels. However, these bins will facilitate the transition of all LDT3s and 4s into the Tier 2 program. Based upon substantial comments from industry, we believe that these bins are appropriate to permit the 50 state sale of California LEV I vehicles nationwide so that manufacturers do not have to certify separate short-lived configurations for non-California sales.

We are finalizing a PM standard for the highest bin that includes a higher PM (0.08 g/mi) value than in our proposal (0.06 g/mi). This bin will likely only impact diesel HLDTs in 2007 when they will phase in to the interim program. This bin will enable their certification given the higher sulfur diesel fuel that will be available during the interim program. We expect to propose in the near future low sulfur diesel fuel standards, which, if finalized, would make such fuel widely available when HLDTs begin phase-in to Tier 2 standards in 2008. We are finalizing the same PM values that we proposed for the final Tier 2 bins (PM values of 0.01 or 0.02 g/mi).



**COMMENT B:** EPA must adopt the same principle as is being adopted by California -- vehicles used for the same purpose, regardless of size, should be required to achieve the same emissions standards. This is because by approximately 2005, vehicles will be roughly split between passenger cars and light trucks, with the proportion of the latter increasing thereafter. **(American Lung Association (IV-D-167), p. 2, STAPPA/ALAPCO (IV-D-67), p. 3)** Other commenters also support a single standard for all vehicles covered by the Tier 2 program. **(20/20 Vision (IV-F-38), 20/20 Vision (Denver) (IV-F-133), Alabama Dept. of Environmental Management (IV-D-201), Alliance for a Sustainable Future (Philadelphia - Day 2) (IV-F-131), American Honda Motor Co. (IV-F-48), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Philadelphia - Day 2) (IV-F-131), American Lung Association of Georgia (IV-F-13), American Public Health Association/Sierra Club (IV-D-86), Appalachian Mountain Club (IV-D-251), Boulder County Health Department (IV-F-86), California Air Resources Board (IV-D-271), p. 2, Campaign on Auto Pollution (IV-F-44), City of Boulder (IV-F-85), Clean Air Council (IV-F-28), Clean Air Network, et. al. (IV-F-95), Colorado Environmental Coalition (IV-F-87), Colorado Public Interest Group (IV-F-901), Delaware Valley Transit Users Group (IV-F-50), Department of Environmental Health, City and County of Denver (IV-F-62), Earth Day Coalition (IV-F-82), Environmental and Energy Study Institute (IV-D-283), Erin Kelly (Denver) (IV-F-133), Evangelical Environmental Network (IV-F-22), Fletcher, Robert E. (Atlanta) (IV-F-132), Galik, D.S. (IV-F-79), International Center for Technology Assessment (IV-D-122), p. 2, Kondas, L. (IV-F-66), League of Women Voters (IV-D-213), League of Women Voters of Maryland (IV-D-274), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Maden, Rachel (Philadelphia - Day 2) (IV-F-131), Maine Dept. of Environmental Protection (IV-D-177), Maslin, Mindy (Philadelphia - Day 2) (IV-F-131), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 1, Michigan Environment Council (IV-F-105), Montgomery Intercounty Connector Coalition, Inc. (IV-D-41), Montgomery Intercounty Connector Coalition, Inc. (Philadelphia - Day 1) (IV-F-131), Mountcastle, Brooks (Philadelphia - Day 2) (IV-F-131), NESCAUM (Philadelphia - Day 1) (IV-F-131), National Conference of State Legislatures (IV-D-214), National Environmental Trust (IV-F-26), National Park Service (IV-F-121), Nissan North America, Inc. (IV-D-125), p. 2, NESCAUM (IV-D-130), p. 3, Ohio Public Interest Research Group (IV-F-98), Oregon Department of Environmental Quality (IV-F-57), Oregon (Office of the Governor) (IV-D-27), Oregonians for Clean Air (IV-D-202), Ozone Transport Commission (IV-D-112), p. 2, PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 2, Pete Maysmith (Denver) (IV-F-133), Physicians for Social Responsibility (IV-D-194), Plant, T. (IV-F-60), Puget Sound Air Pollution Control Agency (IV-D-138), Rohm and Haas, Agricultural Chemicals Division (IV-F-25), Rollins, Rebecca (IV-F-910), Rovito, S. (IV-F-68), STAPPA/ALAPCO (IV-F-117), Sierra Club (IV-F-14), Sierra Club (IV-F-3), Sierra Club (IV-F-49), Sierra Club, Southwest Region (Denver) (IV-F-133), State of Connecticut, Dept. of Environmental Protection (IV-F-2), State of Missouri Dept. of Natural Resources (IV-D-192), State of Wisconsin (IV-D-166), Township of Springfield (IV-D-105), U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (IV-F-55), U.S. Public Interest Research Group (Atlanta) (IV-F-132), Union of Concerned Scientists (IV-D-195), p. 2-3, Union of Concerned Scientists (IV-F-88), Washington State Dept. of Ecology (IV-D-175), White, Randall F. (IV-F-10), Winant, Howard (IV-F-18), Wyncote Audubon Society (IV-F-8)**

**RESPONSE:** A single set of standards for all Tier 2 vehicles was a key principle of our proposal and remains a key principle in our final rule. We believe that vehicles that are generally put to the same uses should comply with the same standards. Consequently,

while our phase-in schedules and interim average NO<sub>x</sub> standards differ for the lighter vehicles and the heavier vehicles, these are simply stepping stones to our final program which will provide one set of standards (bins) for manufacturers to choose from and will require the attainment of one average NO<sub>x</sub> standard for all of a manufacturer's light-duty vehicles and light duty trucks.

**COMMENT C:** It will be difficult for all new cars and light trucks to meet the same standard. **(Alliance of Automobile Manufacturers (IV-D-115), p. 44, Pennsylvania Coalition for Vehicle Choice (IV-F-46))**

**RESPONSE:** We recognize that the Tier 2 standards will pose greater technological challenges for the largest vehicles. However, as we explained in the preamble and RIA to both the NPRM and the final rule, we believe that the standards are technologically feasible now for all categories of light duty vehicles and trucks. We note that the largest trucks will not have to comply with the final Tier 2 standards until 2009. Further, our final rule includes provisions that permit higher emitting vehicles to be averaged with lower emitting vehicles so that a manufacturer may offset vehicles that more easily comply with the average NO<sub>x</sub> standard with vehicles that do not comply as easily. Thus, we do not believe the requirement that all vehicles meet the same set of standards is problematic.

### **Issue 2.1.2: Separate Large Vehicle Standard**

**COMMENT A.1:** EPA should propose a separate standard for trucks because the CAA specifically requires that these heavier vehicles be treated separately. **(National Automobile Dealers Association (IV-D-129), p. 2)** The proposed Tier 2 rules for heavier trucks are invalid because they are not in accord with the requirement that car and heavier truck standards be different. A rule of relative parity must be applied to cars and trucks so that the relative stringency of the standard for each type of vehicle is the same. Abandoning the rule of relative parity is both contrary to the CAA and arbitrary and capricious. The new standards must treat vehicles above and below 6,000 lbs GVWR separately and apply similarly stringent standards to both categories of vehicles. To support their assertion, GM references Section 202(b)(3)(C) of the CAA which defines these heavier vehicles separately, Section 202(a)(3)(A)(ii) which indicates that Congress intended EPA to divide vehicles into classes based in part on weight, and Section 202(a)(3)(E) which requires EPA to achieve equivalency of emission reductions between different types of vehicles. GM references several subsections of 202(i) and asserts that this section grants no authority to regulate heavy-duty vehicles and that any revised standards for these vehicles must be promulgated pursuant to section 202(a)(3)(B). GM also references subsections of 202(d) in discussing the need to determine the useful life for these heavier vehicles separately. GM cites to Thomas C. Austin & James C. Lyons, Sierra Research, Analysis of Compliance Feasibility Under Proposed Tier 2 Emission Standards for Passenger Cars and Light Trucks, dated 7/30/99; NRDC v. EPA, 655 F.2d 318, 322 (D.C. Cir. 1981); International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 639 (D.C. Cir. 1973); and other cases that generally support the assertion that "similar situations must be treated similarly and different situations must be treated differently." **(General Motors Corporation (IV-D-209), vol. 1, p. 4, 38-43) (See other letters listed under Comments A.2 and A.3 that follow.)**

**RESPONSE:** EPA agrees that section 202(i) does not apply to HLDTs and that HLDTs must be regulated under the separate authority of section 202(a)(3), which regulates heavy-duty vehicles. However, while the CAA does specifically define heavy-duty vehicles to be those exceeding 6000 pounds GVW, it does not require them to have different emission standards and it does not prohibit them from having the same standards as light duty vehicles and light duty trucks with GVW below 6000 pounds. Though the Agency must review the standards for HLDTs based on different provisions than for LDVs and LLDTs, the Agency is not prohibited from providing for the same standards for all LDVs and LDTs. The commenter cites to no provision of the statute that prevents the Administrator from determining, based on the separate sections of the Act applying to LDVs, LLDTs and HLDTs, that all LDVs and LDTs should be subject to the same standards. Indeed, section 202(a)(3) of the CAA requires the Administrator, in setting new standards for any class or classes of heavy-duty motor vehicles (including HLDTs) to set such standards:

which reflect the greatest degree of emission reduction achievable through application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology.

We believe we have met the requirement of Section 202(a)(3) in this case by proposing and finalizing standards for heavy duty trucks (HLDTs in our rule) that, after phase-in is complete, are comparable to those for light duty vehicles and light duty trucks. As

discussed elsewhere, the standards for HLDTs are clearly technologically feasible in the time frame provided, giving appropriate consideration to cost, energy and safety factors. Further, the way our program is structured, manufacturers of HLDTs have four additional years to begin to phase-in their Tier 2 vehicles. Manufacturers can build HLDTs to higher standards if they so choose, provided they offset them with vehicles built to lower standards. EPA has provided considerable justification for requiring the same standards for HLDTs and LDV/LLDTs (noting, e.g., that HLDTs are now used as passenger vehicles similar to passenger cars, and thus should be held to similarly stringent standards), and the commenter has failed to rebut the substance of the Agency's decision. This action is both consistent with the Act and reasonable.

The cites provided by the commenter do not help its argument. EPA has shown that these standards are feasible for HLDTs as well as LDV/LLDTs. As the courts note, EPA's determination regarding feasibility is entitled to considerable deference. *NRDC v. EPA*, 655 F. 2d 318, 331 (D.C. Cir. 1981). Similarly, consistent with the *International Harvester* case, 478 F. 2d 615 (D.C. Cir 1973), EPA has separately reviewed the standards promulgated today for LDVs, LLDTs and HLDTs, and found that they are appropriate for all of these classes of vehicles.

**COMMENT A.2:** Resetting standards for vehicles greater than 6,000 lbs GVWR is outside the scope of Tier 2. The terms light duty vehicle, light duty truck and heavy duty truck are clearly and consistently separated throughout Title 2. The construction of Section 202(g) particularly limits the scope of Tier 2 to vehicles under 6,000 lbs GVWR. Congress has clearly expressed that vehicles be separated into defined weight classes with appropriate emissions standards for each class. EPA should adopt the Alliance proposal, which includes separate and technologically feasible standards for vehicles greater than 6,000 lbs. **(DaimlerChrysler (IV-D-59), p. 4)**

**RESPONSE:** Section 202(i) of the CAA directs EPA to conduct a study of Phase [Tier] 2 standards for light-duty vehicles and light duty trucks and does not require it to include heavy-duty trucks, as defined in the Act. It also does not prevent EPA from reviewing the possibility of future standards for HLDTs at the same time as the study or in any subsequent rulemaking. We believe that our Tier 2 final rule maintains appropriate emission standards for each class of vehicles, and we have justified the standards for each class of vehicles separately under the appropriate authority for each respective class. Our program provides manufacturers with considerable flexibility to set their own standards for their various classes of vehicles, provided that they comply on average with a specific NO<sub>x</sub> standard. Further, we believe that not to control heavy duty vehicles to the levels in our Tier 2 final rule would represent an abrogation of our responsibilities under section 202(a)(3) of the Act (quoted above).

Emission control technology has made significant progress since the 1990 amendments to the Clean Air Act. We believe it is perfectly reasonable under the Act to tighten standards applicable to trucks over 6000 pounds GVWR at the same time as we fulfill our responsibilities under section 202(i) of the Act.

**COMMENT A.3:** EPA ignores Section 202(a)(3)(A) which allows EPA to set standards for different classes based on GVWR or other factors. Because engine manufacturers must design HLDTs for potential use as work-capable vehicles, these vehicles have different emission characteristics. Therefore, these vehicles should have a separate standard.

**(Engine Manufacturers Association (IV-D-71), p. 4-7, 13)**

**RESPONSE:** See our response to Issue 2.1.2.A.1. above and 2.1.3 below. While we are allowed to set different standards based on GVWR and other factors, we are not required to do so. We believe the standards we are finalizing are technologically feasible and can be met by trucks that are designed to be work-capable vehicles. We are adjusting our test procedures to permit the testing of all light trucks at loaded vehicle weight (curb weight plus 300 pounds) in demonstrating compliance with our standards. Previously, under less stringent standards, HLDTs were required to undergo testing at adjusted loaded vehicle weight (ALVW which equals curb weight plus half the rated payload of the vehicle).

As we have explained in the preamble to the NPRM and final rule and in numerous other forums, our concern is that LDTs are increasing in sales and they are widely used as passenger vehicles. We recognize that LDTs also must be capable of performing when fully loaded as when pulling a trailer or hauling cargo and crew. We believe, and comments have not convinced us otherwise, that under the provisions of 40 CFR 86, LDTs of all categories can meet our interim and Tier 2 standards and still retain their capabilities to perform the work they are designed to do.

**COMMENT B.1:** There should be a separate fleet average/standard for trucks between 6,000 and 8,500 lbs (Alliance proposal) as follows: 0.20 g/mi NO<sub>x</sub>, 0.156 g/mi NMHC, and 4.2 g/mi CO between 2004 and 2007 and 0.07 g/mi NO<sub>x</sub>, 0.156 g/mi NMHC, and 4.2 g/mi CO between 2008 and 2011. A separate standard is necessary for full size trucks. Subjecting these trucks to the same fleet average as all other vehicles would place manufacturers who produce both cars and trucks at a competitive disadvantage.  
**(General Motors (Philadelphia - Day 1) (IV-F-131)) (See other letter listed under Comment B.2 that follows.)**

**RESPONSE:** A separate fleet average standard for larger trucks is not necessary in the final Tier 2 program. As we have explained in response to other comments above, we believe all LDV/Ts can meet the Tier 2 standards and our program provides considerable flexibility and lead time for application of technology, especially for HLDTs. Numerous commenters argued against a separate average standard (see below). Further, subjecting the heavier trucks to the same fleet average standard as cars and lighter trucks does not put "full line" manufacturers who produce a full range of vehicles at a competitive disadvantage in an overall sense. In the final Tier 2 program, a manufacturer who produces no HLDTs must make all of its LDV/LLDTs comply with a 0.07 g/mi NO<sub>x</sub> average. A full line manufacturer could do the same, or it could choose to potentially reduce overall costs by focusing its resources on further emission reductions from its LDV/LLDTs in favor of less reductions from HLDTs. If these reductions can be had more cost effectively from the LDV/LLDTs than from the HLDTs, the manufacturer will use the reductions from the lighter vehicles to offset the HLDTs that are certified to higher bins. The full line manufacturer can remain competitive by allocating the extra costs applied to the lighter vehicles to the heavier vehicles which receive the benefit. The end result is that a full line manufacturer has more flexibility to reduce its overall costs than it would if we implemented separate fleet average standards for LDV/LLDTs and HLDTs.

**COMMENT B.2:** AAM notes that the California provision to allow manufacturers to certify

up to 4 percent of its larger LDTs to a higher NO<sub>x</sub> standard fails to provide significant relief or flexibility for this class of vehicle since most manufacturers have no LDTs with a max base payload of at least 2,500 lbs and the option provides little relief for NO<sub>x</sub> and no relief for other constituents (e.g. NMOG). EPA should instead adopt the Alliance proposal, which includes separate standards for these vehicles. The Alliance proposal notes that implementation of the 2008 standards is contingent upon the following: 5 ppm max sulfur fuels (gas & diesel), feasible for lean-burn (gas & diesel), no anti-competitive impact, and cost-effective and affordable. AAM includes the following as supporting documentation: Sierra Research, Report No. SR99-07-02, Analysis of Compliance Feasibility under proposed Tier 2 Emission Standards for Passenger Cars and Light Trucks, dated 7/30/99. [Item 2 in Appendix C to AAM letter] **(Alliance of Automobile Manufacturers (IV-D-115), p. 44, 72-73, 76)**

**RESPONSE:** We are not adopting the California provision mentioned by the Alliance in its comments. That provision is unnecessary in the federal program, because our program provides higher bins than does California's to enhance manufacturer flexibility.

Although we are adopting a number of recommendations from the Alliance, including one of the bins they suggested, we are not adopting provisions to provide higher hydrocarbon standards for the HLDTs in the final program. We believe the NMOG standards we are finalizing can be met cost effectively with current technologies. We are also not providing the additional two years (until 2011) for all HLDTs proposed by the Alliance. We are already providing manufacturers with more time for the HLDTs than allowed by the California program, and manufacturers will not have to begin phasing HLDTs into the Tier 2 standards until model year 2008.

Our final program structure does provide for higher NMOG standards for HLDTs in certain higher bins through 2008. Also, we are meeting the Alliance's recommendation for a 4.2 g/mi CO standard in all but the lowest bins. We do not believe that HLDTs will have significant problems meeting the NMOG (or CO) standards we are finalizing. As the preamble and RIA to both the NPRM and final rule make clear, the technology to meet Tier 2 standards exists today and we are providing HLDTs with as much as nine years to implement that technology. We note that HLDTs will have to meet a declining NMOG average standard of 0.050 in California in 2008 when our phase-in of the final Tier 2 standards begins for HLDTs. (Note that the 0.050 NMOG average standard referenced here applies to the California equivalent of our LDT2s and HLDTs when averaged together). Nevertheless, we are providing for higher NMOG standards for interim LDT2s and LDT4s certified to bins 9 and 10 provided their manufacturer brings all of its 2004 HLDTs into compliance with our interim requirements in 2004. See preamble for details.

**COMMENT C.1:** Opposes Alliance proposal for a separate--higher--fleet average for vehicles 6,001 to 8,500 lbs GVWR. Also notes specific opposition to AAM's proposal to relax the full truck NMHC standard from 0.09 to 0.156. Argues that the data shows that further catalyst formulation and enhanced calibration should allow both the NO<sub>x</sub> and the NMHC standards to be met, and notes that API/CRC studies demonstrate the same capability for large and small vehicles. **(American Petroleum Institute (IV-D-114), p. 150, Marathon Ashland Petroleum (IV-D-81), p. 68-69)) (See other letters listed under Comment C.2 that follows.)**

**RESPONSE:** We agree with this comment. We do not believe an NMOG standard of

0.156 is necessary for all HLDTs. We are not adopting the Alliance's proposal for separate higher fleet averages for vehicles between 6001 and 8500 pounds GVWR (the HLDTs). While our interim bins include some higher NMOG standards for HLDTs during the interim program, in the final Tier 2 bins, there will be no separate, higher standards for HLDTs. See our responses under comment B.2. above for a discussion of optional higher NMOG standards for certain LDT2s and LDT4s.

**COMMENT C.2:** Both CARB and EPA have demonstrated that HLDTs can meet passenger car standards with minor changes to conventional emission control technology. The LEV II allowance approach is more appropriate to address concerns for work trucks that fall into the HLDT category. **(California Air Resources Board (IV-D-271), p. 2)**

**RESPONSE:** We note above that we do not believe the LEV II allowance approach adopted by California for trucks with large payload capacity is needed in the federal program which has additional, higher bins not available in California. We agree with California's assertion that HLDTs can meet the same standards as passenger cars.

### **Issue 2.1.3: Separate Diesel Vehicle Standard**

**COMMENT A:** Opposes separate diesel vehicle standard. [See related points under Issue 2.1.1, Comments A and B, and Issue 3.1, Comments A and C.] **American Public Health Association/Sierra Club (IV-D-86), Chicago Dept. of the Environment (IV-D-200), Colorado Environmental Coalition (IV-F-87), Environmental and Energy Study Institute (VI-D-283), League of Women Voters (IV-D-213), Ozone Transport Commission (IV-D-112), p. 2-3, Pete Maysmith (Denver) (IV-F-133), U.S. Public Interest Research Group (IV-F-102), Union of Concerned Scientists (IV-D-195), p. 1, 8-9**

**RESPONSE:** We did not propose, and are not finalizing, any separate diesel vehicle standards. We expect that diesel vehicles will be able to meet the interim FTP standards without low sulfur diesel fuel and we believe that the final Tier 2 standards will be feasible for diesels if low sulfur diesel fuel is made available. We recognize that diesels may be concentrated in the upper bins and may also be among the last vehicles phased-in in any of the phase-ins in our interim and Tier 2 programs.

**COMMENT B:** EPA should either revise the standard to make lean-burn, fuel-efficient technologies feasible in the context of the overall emissions program, or it should promulgate different, more feasible standards for these vehicles. Because lean-burn technology could not feasibly satisfy the proposed standards, those standards would effectively prohibit the use of energy-saving, lean-burn technology, which would flaunt the statutory directive to consider energy impacts. Barring energy gains in favor of minimal or nonexistent needs would "evidence not a rational weighing of the statutory factors, but an outright attempted abrogation of the former factor." EPA could promulgate a single standard that is feasible for conventional and lean-burn engines alike, or it could promulgate separate standards for the two types of engines. GM cites to section 202(a)(3)(A)(ii) to emphasize that EPA may create standards under a different category based on "type of fuel used." **(General Motors Corporation (IV-D-209), vol. 1, p. 46-37, 52)**

**RESPONSE:** We have not flaunted the statutory directive to consider energy impacts. In fact, we have considered energy impacts in full with respect to the fuel program, the energy impacts of gasoline desulfurization, and those of Tier 2 vehicle technology. Likewise, we see no real energy impacts with respect to the vehicle program. Elsewhere in the rule, we note that the effect of this rule on the fuel efficiency of standard gasoline-powered engines (i.e. the engines that are used in over 99% of the current fleet) will be minimal. Nor do we believe that this rule will reduce fuel efficiency. With regard to potential increases in use of more fuel-efficient technologies in the future, without an increase in the CAFE standards, there is no reason to believe that vehicles using more fuel efficient technologies will lead to increased average fuel economy given that the current CAFE standards are being met with gasoline spark-ignition technology. In fact, any increase in the use of more fuel-efficient vehicles, in the absence of more stringent CAFE standards, will likely be used merely to offset the increased production of less fuel efficient vehicles, leading to no increase in fuel economy (and thus no energy impact) and an increase in emissions. Given that these technologies are not a significant portion of the current market (in fact, direct injection gasoline vehicles are not even sold currently in this market), that increased use of these vehicles will not likely lead to greater average fuel economy, and that increased use of these vehicles, combined with the less stringent standard the commenter is requesting, could lead to very large emission increases compared to what would otherwise be expected, there is little reason to allow



these technologies to be sold at less stringent standards. Also, with the price of motor vehicle fuels in this country, and the recent trend toward more fuel inefficient vehicles, there seems to be little public pressure on automobile manufacturers to deliver greater fuel efficiency. Further, the fact that automobile manufacturers have opposed increases in CAFE standards (see "Auto Lobbying Defeats Senate's Efforts To Toughen Truck, SUV Gas Standards," Wall Street Journal. Sept. 16, 1999) indicates that manufacturers are not realistically intending to increase the fuel economy of their fleets in the near future.

We believe our final standards will be able to be met by lean-burn technology vehicles with available fuels. We are not promulgating more stringent diesel fuel sulfur standards in this rule, because the small number of diesel vehicles in the light duty market would not justify the expense of the costs for the fuel change. However, we are reviewing the possibility of promulgating such diesel fuel sulfur standards in the context of rulemaking for heavy-duty engine standards, where diesel engines make up a substantial portion of the market (We expect in the near future to propose such a rule, including low sulfur diesel fuel to be available in the 2007 timeframe) We believe that further reductions in gasoline fuel sulfur controls beyond what is promulgated today are not warranted at this time based on its possible necessity for gasoline lean burn engines, given the fact that such engines are not even present in the current market and speculative nature of any future use of such engines, as well as the possibility that the evolving technology for such engines could allow for their use given our promulgation of low sulfur gasoline standards today. Given the advanced state of automotive emission control that exists now and the implementation of further advances that will be made possible by fuel changes expected for both gasoline and diesel fuel, we see no need to create a set of relaxed standards that could sacrifice air quality benefits and public health.

In the timeframe when Tier 2 standards are required, we expect they will be feasible for diesel technology engines as well as for spark ignition engines. The Tier 2 standards will not present a barrier to improving fleet fuel economy for advanced technology vehicles or engines.

**COMMENT C:** EPA should withdraw rules regarding light-duty diesel vehicle standards until appropriate diesel sulfur levels can be determined based upon the needs of most diesel fuel users (i.e., heavy duty engines). Introduction of light-duty diesel emission standards should be timed with future heavy duty diesel desulfurization given the still undeveloped light duty diesel market, and the potential CO<sub>2</sub>/increased fuel economy benefits associated with encouraging the light duty diesel market to begin to develop. (American Trucking Associations (IV-D-70), p. 3), (Phillips Petroleum Company (IV-D-82), p. A3)

**RESPONSE:** As discussed elsewhere, EPA does not believe it is appropriate to promulgate different standards for diesel light duty vehicles and trucks. Similarly, it would not be appropriate to delay the promulgation of standards for diesel vehicles. We agree, however, that standards for diesel fuel should be promulgated in the context of promulgating standards for heavy-duty engines.

**COMMENT D:** EPA needs to make final decisions for diesel vehicles and fuels at the same time, and the proposal inappropriately disregards the vehicle/fuel system approach for LDV/LDT diesels. The fuel-neutral proposal could result in diesel vehicles being

unable to meet the Tier 2 standards even with diesel fuel changes. The Agency needs to synchronize the two rulemakings. In addition, the proposal fails to make the findings required under section 202(i) for proposing new diesel vehicle standards. The Agency cannot justify the proposed diesel requirements solely on its desire for fuel neutrality. To justify diesel standards, EPA needs to undertake the same analysis it performed for gasoline vehicles, including whether given emission reductions from gasoline -powered vehicles, the proposed (or any) standards for diesel vehicles (and fuels) are technically and economically appropriate. A separate economic analysis is required because the technology, costs, and fuel production characteristics are fundamentally different.

**(American Petroleum Institute (IV-D-114), p. 138-139, American Trucking Associations (IV-D-70), p. 2-3, Marathon Ashland Petroleum LLC (IV-D-81), p. 25)**

**RESPONSE:** EPA disagrees with the commenters regarding any requirement to evaluate the appropriateness of new standards for diesel-fueled vehicles, apart from gasoline-fueled vehicles, under section 202(i). Section 202(i) requires EPA to review the appropriateness of new standards for LDVs and LDTs, and does not distinguish between diesel-fueled and gasoline-fueled vehicles in requiring EPA to review and promulgate such standards. Nothing in the text of section 202(i) provides any justification for dividing these categories of vehicle into different subcategories of diesel-fueled and gasoline-fueled vehicles. By comparison, EPA may, but is not required to, distinguish between such subcategories in promulgating standards for heavy-duty vehicles under section 202(a)(3). It is also worth noting that the separate NO<sub>x</sub> standard for diesel engines under Tier 1 explicitly ends after model year 2003.

Nor does EPA believe it is appropriate to promulgate separate standards for diesel vehicles in the LDV/LDT fleet, whether under section 202(i) or under section 202(a)(3)(A). As the commenters acknowledge, diesel vehicles currently represent a tiny percentage of the LDV/LDT market. Further, diesel vehicles do not represent a critical segment of the market, as gasoline-fueled vehicles can and do exist (in greater numbers) in all segments of the market that are occupied by diesel LDV/LDTs. Thus, gasoline-fueled LDV/LDTs provide for the consumer the full panoply of vehicles in the LDV/LDT fleet. See International Harvester v. Ruckelshaus, 478 F. 2d 615, 640 (D.C. Cir. 1973) ("as long as feasible technology permits the demand for new passenger automobiles to be generally met, the basic requirements of the Act would be satisfied, even though this might occasion fewer models and a more limited choice of engine types. The driving preferences of hot rodders are not to outweigh the goal of a clean environment.").

On the other hand, allowing separate, and less stringent, standards for diesel LDV/LDTs could potentially create substantial problems for the Tier 2 program. If EPA allowed diesel LDV/LDTs to be sold at less stringent standards than gasoline LDV/LDTs, manufacturers would have an obvious incentive to build more diesel-fueled vehicles. Given that manufacturers have already indicated that they may wish to increase their percentage of diesel-fueled vehicles in the future, such an incentive to build such vehicles, at higher emission rates, could seriously undermine the emission reductions expected and needed from the Tier 2 program. EPA therefore cannot justify allowing diesel-fueled vehicles to emit at higher rates than the gasoline-fueled vehicles in this market.

The stringent standards required by this rule do not prohibit the manufacture of diesel-fueled vehicles, but merely require them to meet the same standards as can be met by gasoline-fueled vehicles. However, as the commenters note, the final standards for Tier

2 that are fully effective in 2007 for LDV/LLDTs and 2009 for HLDTs are not likely to be feasible for diesel engines without changes to diesel fuel sulfur levels. EPA does believe, as discussed in the preamble and the RIA, that the interim standards are feasible for diesel engines without changes to diesel fuel content, and that the final standards are likely to be feasible with diesel fuel sulfur changes. EPA has provided several years of lead time prior to the full implementation of the final Tier 2 standards, in part to allow for the development of technology to reduce diesel engine emissions. During this phase-in period, manufacturers will be able to sell diesel vehicles in the marketplace at (in fact, well above) their traditional percentages. If manufacturers wish to increase the levels of diesel-fueled vehicles in their fleet from historic levels, they may do so. But they may not use the possibility of such a future occurrence, based on manufacturer choice, to substantially undermine the emission standards, and emission reduction goals, of this rule. Manufacturers have a clear path towards meeting the standards set in this rule using advances in conventional technology that can easily be predicted. The fact that some manufacturers may wish to change their fleet in a manner inconsistent with current levels is not a justification for requiring EPA to endanger the air quality goals of the Tier 2 program. Additionally, the increased costs associated with increasing diesel vehicle numbers in the light-duty fleet are costs that result from this manufacturer choice, not from the Tier 2 standards.

EPA has been looking closely at the issue of whether diesel fuel should be changed in order to allow for the use of technologies to reduce diesel engine emissions. Such technologies require the use of low sulfur diesel fuel. However, changing diesel fuel in the context of the Tier 2 rule is not as straightforward as changing gasoline. As noted above, diesels represent a very small percentage of the LDV/LDT market. The changes that would be required of diesel fuel refiners to implement lower sulfur diesel fuel will be substantial, and would likely lead to higher diesel fuel prices. Other parties in the diesel distribution system could also be affected. Given the significant potential costs of such fuel changes, and the small percentage of LDV/LDT vehicles using diesel fuel, EPA believes it is inappropriate to make such changes in the context of a rule regulating light duty vehicles and engines. As commenter ATA notes, any such changes should more appropriately occur in the context of reviewing emission control needs for heavy-duty vehicles and engines, where diesel engines represent a large and critical portion of the population. EPA is reviewing such issues now in a different proceeding. If changes in diesel fuel sulfur levels are determined to be appropriate, EPA will certainly review the level and implementation dates of such changes to diesel fuel with the knowledge that such issues could affect the ability of manufacturers to build light-duty diesel vehicles and trucks under Tier 2, and that the benefits of such changes to diesel fuel would be increased if they are implemented in a manner that conforms with these Tier 2 diesel concerns.

**COMMENT E.1:** Recommends that EPA either establish separate standards for diesel vehicles or delay the timing for including the new standard for diesel vehicles until diesel fuel sulfur is reduced. The LDV/LDT diesel market is too small to support the infrastructure necessary for a separate LDV diesel fuel grade. Thus, EPA either needs to set separate diesel vehicle standards, or EPA needs to wait until diesel fuel sulfur reductions are required for the entire diesel fuel market, given that diesel vehicles apparently cannot meet the Tier 2 standards without low sulfur diesel fuel. **(Conoco, Inc. (IV-D-124), p. 3) (See other letters listed under Comments E.2 through E.7 that follow.)**

**RESPONSE:** As explained in our response to 2.1.3.C above, we see no reason to

promulgate separate standards for diesel vehicles and we note that our final rule contains sufficient flexibilities to enable manufacturers to delay the impact of the Tier 2 standards on their diesel vehicles until the last applicable phase-in year if they need to. We would expect in our diesel fuel NPRM that there would be separate fuels for light duty vehicles and trucks. As noted above we believe our efforts to reduce sulfur in on-highway diesel vehicles will also promote or enable significant emission reductions from heavy duty diesels.

**COMMENT E.2:** In the preamble to the NPRM, EPA asserts it would be neither technically nor commercially feasible for gasoline-powered vehicles to meet the Agency's proposed standards without simultaneously lowering sulfur levels in gasoline. This conclusion applies equally to diesel-powered vehicles. Making the rule final as proposed (i.e. without also controlling diesel sulfur) would violate section 202(a)(3)(A) of the CAA. **(Alliance of Automobile Manufacturers (IV-D-115), p. 13-18)**

**RESPONSE:** As discussed above, in the response to 2.1.3.D, EPA does not believe it is required under section 202(i) or section 202(a)(3)(A), or appropriate, to promulgate different standards for LDVs and LDTs. The standards finalized today are feasible for the broad range of LDVs and LDTs. EPA has separately reviewed the feasibility of these standards for diesel vehicles, but does not believe that separate standards are appropriate, given the small percentage of this market made up of diesel vehicles and the significant emissions increases that could occur if separate standards for diesel vehicles were promulgated. As noted above, EPA is currently reviewing the need for reducing sulfur in diesel fuel in the context of lowering emissions from heavy-duty engines. Given the historically small number of light duty diesel vehicles and trucks and the uncertainty of any future increases in such numbers, EPA believes that the most appropriate place to review the need for diesel fuel sulfur reductions, given the substantial costs of such reductions, is in the context of heavy-duty engines, where such sulfur reductions can more straightforwardly be linked to actual and substantial reductions in emissions from motor vehicles. Though manufacturers have noted their interest in increasing the numbers of diesel engines in the light duty fleet in the future, and the government has in fact worked with manufacturers on innovations for diesel engines to reduce emissions from such engines in the context of the Partnership for a New Generation of Vehicles, the present existence of diesel engines in substantial numbers in the heavy duty fleet, and the lack of such engines in substantial numbers in the current light duty fleet, make changes to diesel sulfur requirements more appropriately reviewable in the context of regulations on the heavy duty fleet.

Regarding EPA's justification for more stringent PM standards, as EPA states elsewhere, these standards are clearly feasible for the vast majority of LDV/LDTs, and ensure that PM levels do not increase as a result of greater use of diesel engines in the future. As noted above, EPA believes that diesel engines can meet the interim standards promulgated today, within the bin structure, and that they will meet the final Tier 2 standards with low sulfur fuels.

**COMMENT E.3:** Just as low-sulfur gasoline is essential for compliance with the Tier 2 emission requirements, clean diesel fuel is equally essential. Low-sulfur, clean diesel fuel would result in an immediate reduction in the emissions of current diesel-powered vehicles and would act as an enabler for further NO<sub>x</sub> and PM control. For the reasons EPA linked the feasibility of Tier 2 rules for gasoline engines to the availability of low sulfur gasoline, the CAA also mandates EPA's imposition of diesel emission limits be

accompanied by regulations requiring cleaner diesel fuel. Volkswagen provides a detailed legal analysis of this issue (Appendix A) as an attachment to their letter. **(Volkswagen of America, Inc. (IV-D-60), p. 2)**

**RESPONSE:** See Responses above for 2.1.3.D and 2.1.3.E.2.

**COMMENT E.4:** Although EPA acknowledges the need for low sulfur diesel fuels, it nevertheless fails to propose standards for such fuels. Thus, contrary to EPA's claim of fuel neutrality, the rule will preclude the use and development of advanced diesel-fueled technologies for use in light-duty vehicles. EPA must act to assure the availability of near-zero sulfur diesel fuel beginning in 2004 on a nationwide basis. **(Engine Manufacturers Association (IV-D-71), p. 6-7,30)**

**RESPONSE:** See Responses above for 2.1.3.D and 2.1.3.E.2. Further, EPA does not believe that reduced sulfur diesel fuel will be necessary for diesel engines to meet the interim NO<sub>x</sub> or PM standards, given the bin structure. Thus, reduced sulfur diesel fuel would not be necessary for diesel engines to meet the standards in the Tier 2 rule until at the earliest 2007 for LDV/LLDTs and 2009 for HLDTs.

**COMMENT E.5:** EPA's effective preclusion of diesel technologies in the light-duty market is in clear contravention of Congressional intent as expressed in section 202(i) of the CAA. **(Engine Manufacturers Association (IV-D-71), p. 7-8)**

**RESPONSE:** See Responses above for 2.1.3.D and 2.1.3.E.2.

**COMMENT E.6:** EPA's disregard of such critical statutory factors in Section 202(a)(3)(A) as gross vehicle weight and type of fuel is unreasonable and has resulted in EPA's proposing emission standards that it agrees are infeasible without low sulfur fuel, fuel for which no provision is made in the rule. This is contrary to the intent of Congress and constitutes an improper exercise of EPA's authority for larger light duty trucks. Congressional intent for separate, non-preclusive treatment of diesel-fueled engines is also found in Sections 202(g)(1) and 202(h), which provide separate standards for diesel-fueled LLDTs and HLDTs. **(Engine Manufacturers Association (IV-D-71), p. 8)**

**RESPONSE:** See Responses above for 2.1.1, 2.1.2, 2.1.3.D, and 2.1.3.E.2. EPA disagrees with the commenters interpretation of section 202(a)(3)(A)(ii). Though the statute gives EPA authority to distinguish between different types of HDEs based on gross vehicles weight and type of fuel used, the statute does not require that EPA distinguish between such factors in promulgating standards. EPA has not "disregarded" gross vehicle weight and type of fuel used in making its decision. EPA has instead made a considered decision, as discussed in the responses above and in the preamble to this rule, that it would be inappropriate to distinguish between such types of engines in these standards. This is fully within EPA's considered discretion. The legislative history on this particular provision is relatively silent. However, in the context of another provision under which EPA is given authority to place mobile sources into classes or categories, the legislative history indicates that EPA is not required to subdivide categories of mobile sources into subcategories and subclasses, and that EPA should be given significant discretion in its reasonable choices regarding whether or not to subcategorize. See 136 Cong. Rec. 290 (Statement of Sen Chafee: "Categories [for nonroad engines] are to be

drawn as broadly as possible consistent with the need to issue control requirements that apply to the category.")

The commenter notes that under sections 202(g) and 202(h), Congress provided some relief for diesel-fueled vehicles from the Tier 1 LDV/LDT NO<sub>x</sub> standards. However, such relief was not required under section 202(i) or section 202(a). Moreover, even in those subsections, the relief either ended as of 2003 or applied only to the intermediate standards, not the full useful life standards.

**COMMENT E.7:** EPA also fails to consider the strategic "energy impacts," as required by Section 202, associated with diesel engines. These engines have been identified as the most likely technology to deliver large fuel economy improvements in the near future and thereby reduce greenhouse gases. **(Engine Manufacturers Association (IV-D-71), p. 6-8)**

**RESPONSE:** Please refer to responses to issues 1.2.E and 2.1.3.B. The commenter is correct that we must give consideration to the energy impacts of these standards, though such consideration does not supplant the agency's responsibility to give primary consideration to the specific criteria raised under section 202(a) and section 202(i). EPA has given consideration to the energy impacts of this rule. As discussed in our response to issue 2.3.B.1 above, the final standards will have a minimal impact on the fuel-efficiency of conventional gasoline vehicles, which represent the overwhelming majority of the population of these vehicles. These regulations will also have little impact on fuel economy in general. Manufacturers can build diesel vehicles at or above their traditional levels during the interim periods. Regarding EMA's comment about the future of diesel's share of the market, EMA does not claim that manufacturers would use the increased fuel economy of diesel vehicles to increase total fleet fuel economy. Rather, manufacturers will likely meet current corporate average fuel economy standards by averaging such diesel vehicles with gasoline vehicles that are even less fuel efficient than current gasoline fueled vehicles. From an energy standpoint, there is no gain. There would, however, be a loss to the environment resulting from allowing diesel vehicles to emit at levels above gasoline-fueled vehicles.

**COMMENT F:** EPA's application of more stringent Tier 2 standards to diesel LDVs and LDTs is arbitrary. EPA does not cite any provision in the Clean Air Act that supports the fuel neutrality principle. In addition, EPA admits that the necessary emission control technology to meet diesel Tier 2 standards is presently not available. **(U.S. Chamber of Commerce (IV-D-142))**

**RESPONSE:** See Responses to 2.1.3.D and 2.1.3.E.1-E.7. In addition, section 202(i) requires that EPA review standards for all LDVs and LDTs and does not specify that EPA should differentiate between diesel and gasoline fueled vehicles. The commenter provides no statutory justification for making such a differentiation. Nor does the commenter seriously address the damage that could occur to the expected emission reductions of the Tier 2 program if the percentage of diesel engines, held to less stringent standards, increases in the vehicle population. The fact that new diesel engines do not emit as much as their predecessors does not insulate them from having to meet more stringent standards to meet air quality need. Virtually all current sources of pollution are cleaner than their predecessors.

Regarding the comment regarding currently available technology, EPA is not restricted to

looking at only currently available technology in promulgating emission standards for new motor vehicles. The courts have long understood that EPA can promulgate standards that are technology-forcing. EPA's discussion of the technology that can be used to meet the Tier 2 standards is based on significant engineering data, not crystal ball predictions.

**COMMENT G:** Although supports fuel neutrality principle and consistent gasoline and diesel vehicle standards, states that EPA must assure that an LDV diesel fuel is available to consumers by 2005. Commenter refers to its ANPRM comments for an approach to making this fuel available and for an explanation of the technical need for low sulfur diesel. **(U.S. Department of Energy (IV-D-121), p. 10-11)**

**RESPONSE:** See Responses to 2.1.3.D-F, above. We plan to propose in the near future to make low sulfur diesel fuel available for the 2007 model year. We issued an ANPRM on this subject the same day as our Tier 2 NPRM (May 13, 1999). We expect to issue our NPRM on low sulfur diesel early in 2000 with a final rule to follow as quickly as possible.

Given the current sales fraction of light duty diesel vehicles and trucks, and even allowing for significant growth in market share, our phase-in schedules will easily permit manufacturers to defer diesels to the last year of any phase-in we are prescribing in our final rule. Our Tier 2 phase-in for LDV/LLDTs is 25/50/75/100% beginning in 2004 and running through 2007. The phase-in to our interim program for HLDTs is the same (although manufacturers have an option that could allow them to delay the beginning of the phase-in until the 2005 model year). Our phase-in to Tier 2 standards for HLDTs follows immediately with 50/100% beginning in 2008. Manufacturers will likely defer the vehicles posing the greatest technological challenges to the last year of each phase-in.

The commenter's inputs seem to suggest that diesels should be provided special consideration under the rule. We do not agree. The emissions from diesels harm the public health every bit as much as those from gasoline vehicles, and, even if they do have some environmental benefits inherent in their technology/fuel, the emissions they create must be treated equally as if they were any other technology/fuel. We believe our bins approach accommodates this policy goal within a framework which gives the industry flexibility to choose which vehicles will comply and how they will be done within the phase-in program and bin structure. Technology considerations indicate that low sulfur diesel fuel is needed in the 2007 and later timeframe and EPA is pursuing a rule which considers this requirement.

## **Issue 2.2: Stringency of Proposed Standards**

**COMMENT A:** Supports 0.07 g/mi NO<sub>x</sub> fleet emission averages for both LDVs and LDTs. (Alliance of Automobile Manufacturers (Denver) (IV-F-133), NESCAUM (IV-D-130), p. 3, Ohio Public Interest Research Group (IV-F-98), U.S. Public Interest Research Group (IV-F-102))

**RESPONSE:** We are finalizing 0.07 g/mi NO<sub>x</sub> fleet averages for Tier 2 vehicles. Beginning in 2009 there will be one fleet average of 0.07 g/mi that will apply to all vehicles under 8500 pounds GVW and for certain passenger vehicles over 8,500 lbs which meet the definition of Medium Duty Passenger Vehicle included in our Tier 2 rule.

Issues related to Medium Duty Passenger Vehicles are addressed separately in Issue 39.

**COMMENT B:** EPA should impose the following standards to be consistent with the Alliance proposal (for vehicles < 6,000 lbs.): 0.15 g/mi NO<sub>x</sub>, 0.10 g/mi NMHC, and 4.2 g/mi CO between 2004 and 2007 and 0.07 g/mi NO<sub>x</sub>, 0.09 g/mi NMHC, and 4.2 g/mi CO between 2008 and 2011. Alliance notes that implementation of the 2008 standards are contingent upon the following: 5 ppm max sulfur fuels (gas & diesel), feasible for lean-burn (gas & diesel), no anti-competitive impact, and cost-effectiveness and affordability. AAM includes the following as supporting documentation: Sierra Research, Report No. SR99-07-02, Analysis of Compliance Feasibility Under Proposed Tier 2 Emission Standards for Passenger Cars and Light Trucks, dated 7/30/99. [Included as item 2 in Appendix C to AAM letter] (**Alliance of Automobile Manufacturers (IV-D-115), p. 44**)

**RESPONSE:** We are finalizing our interim and Tier 2 standards largely as proposed. As we indicated in response to Issue 2.1.2.B.1 and B.2, we are making some minor changes to accommodate needs of the manufacturers, but we do not believe the delayed schedule provided by the Alliance is necessary, nor do we believe 5 ppm Sulfur fuel is necessary to comply with our final standards and timeframe. As we have indicated in other responses above, we believe that the appropriate technology to meet our Tier 2 standards is available now and that the additional time proposed by the Alliance is not needed. Also, as we discuss in other responses and in the preamble and RIA for the final rule, we do not agree that 5 ppm sulfur levels are needed in fuel. The technologies we believe will be used to meet Tier 2 standards will be durable for the useful lives of the Tier 2 vehicles on the fuel we will require to become available in the Tier 2 timeframe. No evidence was provided to EPA which even suggests that 5 ppm gasoline is needed to meet Tier 2 requirements.

**COMMENT C:** EPA should only impose non-sulfate PM standards. Manufacturers are working vigorously to develop direct injection advanced technology vehicles that can meet the Tier 2 PM standard. However, in order to do so, EPA must adopt a non-sulfate standard to compensate for sulfate's disproportionately large fraction of the particulate exhaust emissions from these engines. Even when using a 30 ppm sulfur fuel, sulfates will constitute a large fraction of the PM emissions. However, a non-sulfate PM standard alone is insufficient to enable diesel engines to comply with the proposed PM emission standards. Ultimately, near-zero diesel fuel is the only factor that will allow such compliance. Commenters note that HC, CO, and NO<sub>x</sub> emission controls tend to increase



significantly the percent of fuel-bound sulfur that is converted to particulate sulfates ( $\text{SO}_3$  and  $\text{SO}_4$ ). (**Alliance of Automobile Manufacturers (IV-D-115), p. 66, American Petroleum Institute (IV-D-114), Cummins Engine Company, Inc. (IV-D-132), p. 9-12, Engine Manufacturers Association (IV-D-71), p. 17, Marathon Ashland Petroleum (IV-D-81), p. 76, National Automobile Dealers Association (IV-D-129), p. 2, Volkswagen of America, Inc. (IV-D-60), p. 5**)

**RESPONSE:** We believe that it is appropriate to include sulfate PM in our standards and measurements. Our current PM standards do not exclude sulfate PM and sulfur levels in diesel fuel are currently very high. Regulated ambient PM includes sulfate PM. Stationary sources have to limit sulfur and sulfate emissions. Sulfate PM has health effects. The commenters provide no data to show that acidic aerosols such as sulfuric acid aerosols are without significant health effects. Sulfuric acid aerosol has well known acute health effects and may form an extremely fine ( $<100$  nm) nucleated aerosol with a potential for deep deposition in the lungs. Chronic health effects of a fine, nucleated sulfuric acid aerosol are unknown.

We recognize that precious metal exhaust aftertreatment used with diesel engines does tend to increase the oxidation of  $\text{SO}_2$  to  $\text{SO}_3$ , leading to increased formation of sulfates, primarily hydrated sulfuric acid aerosol. Consequently, manufacturers currently use oxidation catalysts with diesels that contain base metals with a small amount of precious metals. We believe that gasoline vehicles will easily be able to comply with our Tier 2 PM standards and that diesel fueled vehicles will be able to meet the PM standards, including sulfates, if low sulfur fuel is made available.

**COMMENT D:** EPA's proposed  $\text{NO}_x$  emission limits and bin structure will prevent lean-burn advanced technology engines from also meeting the PM standards or both sets of standards together. Strategies to reduce  $\text{NO}_x$  emissions will increase PM and vice versa for both diesel and gasoline powered vehicles. In evaluating lean-burn engine technologies, EPA neglected to consider the relationship between  $\text{NO}_x$  and PM, which is critical in determining feasibility. There are some promising technologies that may help manufacturers produce vehicles that meet the PM standard. [AAM discusses at length potential technologies that may successfully reduce PM emissions, along with their limitations (i.e., need for low- zero-sulfur fuel)]. (**Alliance of Automobile Manufacturers (IV-D-115), p. 62-65**)

**RESPONSE:** Information available to us indicates that manufacturers will be able to meet both the  $\text{NO}_x$  and PM limits of the bins in our interim and Tier 2 programs. The  $\text{NO}_x$ /PM trade-off raised by the commenter is only an issue for engines without aftertreatment. We recognize that lean-burn and advanced technology vehicles may need to make use of the higher bins, especially in the early years, however we believe we have provided an appropriate range of bins to handle different technologies, while not compromising on the stringency of the program. Given that there is proven technology for the vast majority of engines to meet the standards, EPA does not believe it is appropriate to compromise the emission benefits of the program for the benefit of technologies that have not been an important part of the light-duty market.

**COMMENT E:** EPA should align CO and formaldehyde (HCHO) standards with existing California standards, using LEV1 standards as a baseline from which to phase in all new

vehicle standards. Since HC and NO<sub>x</sub> are the primary ozone precursors driving the Tier 2 rulemaking, the limits for CO and HCHO, which are related chemically to HC, should move in the same direction as the HC limits. EPA's proposal fails to do this because it retains the same stringency for HC and NO<sub>x</sub> as the California standards but increases the relative stringency for CO and HCHO. EPA should adopt the CO limit outlined in the Alliance proposal: 4.2 g/mi of a full useful life basis -- air quality needs do not justify more stringent CO standards than this. **(Alliance of Automobile Manufacturers (IV-D-115), p. 61)**

**RESPONSE:** In the NPRM, we had a few bins with lower CO and/or formaldehyde standards than the equivalent California bin. While we recognize that these two pollutants are not the focus of the Tier 2 rule, we believe that these two simple compounds will be readily oxidized by aftertreatment devices used to meet NMOG standards and that tighter standards are therefore feasible. In the final rule however, based upon extensive comment, we have aligned CO and formaldehyde standards with California for all bins. Where we have added bins not in the California program, we have imposed CO and formaldehyde standards consistent with the progression of the corresponding NO<sub>x</sub> and NMOG standards in the bin structure.

**COMMENT F:** The proposed formaldehyde standards are a significant unknown for diesel engine manufacturers. EPA should consider promulgations of formaldehyde standards only after adequate time has been allowed for development of the technologies required to meet the NO<sub>x</sub> and PM emissions limits. **(Cummins Engine Company, Inc. (IV-D-132), p. 18, Engine Manufacturers Association (IV-D-71), p. 16)**

**RESPONSE:** Formaldehyde standards are of primary concern only for methanol and CNG vehicles. For other vehicles, including catalyst equipped diesel-fueled vehicles, formaldehyde emission results are usually only a small fraction of the applicable standard. In our final rule, we are permitting manufacturers to waive the testing of formaldehyde for gasoline and diesel vehicles if they have data from a similar technology engine showing clear compliance with the formaldehyde standard.

There are currently very few diesel LDV/Ts. All are equipped with oxidation catalysts, primarily for PM and odor control. Formaldehyde is a simple, highly reactive molecule that is readily oxidized in an oxidizing environment. We expect that exhaust aftertreatment will continue to be used on light duty diesels. For LDV/LLDTs, formaldehyde standards apply to diesels under NLEV and have applied under the Cal LEV program for a number of years. We note that California's formaldehyde standards for HLDTs take effect in 2001. We are not tightening formaldehyde standards beyond those of the NLEV and Cal LEV program. Manufacturers should have sufficient formaldehyde data to meet EPA's requirements by the time our interim standards for HLDTs begin phase-in.

**COMMENT G:** Recommends a lower fleet average NO<sub>x</sub> standard based on CA experience with vehicles certified to the SULEV standard. **(California Air Resources Board (IV-D-271), p. 1)**

**RESPONSE:** We are not adopting this comment. We believe that our Tier 2 rulemaking will lead to substantial, cost-effective reductions in NO<sub>x</sub> emissions. Our Tier 2 rulemaking does not constrain us from reducing NO<sub>x</sub> emission standards further at some

future date subject to relevant statutory requirements such as leadtime in the Clean Air Act

**COMMENT H:** EPA has not provided a thorough analysis and explanation of the costs and benefits of the divergence between the Tier 2 rule and California's program.  
**(General Motors Corporation (IV-D-209), vol. 1, p. 60)**

**RESPONSE:** It is not our obligation to justify our proposal vis-a-vis California's LEV II program. Nevertheless, while the program laid out in our NPRM contained a number of divergences from the California program, most of those have been addressed in our final rule. Our NPRM proposed a number of certification requirements which would have impacted virtually all vehicles—both Tier 2 and interim—in 2004. Manufacturers argued convincingly that these requirements would have virtually eliminated carry-over certification from 2003 to 2004 for all light duty vehicles and trucks and would have greatly reduced manufacturer's abilities to sell California vehicles nationwide. Our final program is much better harmonized with California's to the extent that the main divergence that remains is our requirement that interim LDT2s be averaged with LDVs and LDT1s to meet a corporate average NO<sub>x</sub> standard of 0.3 g/mi. We did not change this item from our NPRM because it provides important early benefits to air quality, approximately 47,000 tons of NO<sub>x</sub> in 2007 and 54,000 tons in 2010. However, our final rule includes an option to allow a slightly higher NMOG standard that will help enable qualifying LDT2s to certify to the bin having the 0.3 g/mi NO<sub>x</sub> standard. Also, we are retaining our provision that interim LDT4s use a bin with a NO<sub>x</sub> value no higher than 0.6 g/mi. (Under Cal LEV I they can meet a NO<sub>x</sub> standard of 0.09 g/mi) We believe this divergence is appropriate given that in the federal program, LDT3s and 4s get two more years to comply than they do in the Cal LEV II program. We believe that manufacturers can readily certify their LDT4s to the 0.6 NO<sub>x</sub> level, however for qualifying LDT4s, we have provided an optional NMOG standard that is slightly higher and will help these interim LDT4s attain compliance with the bin having the 0.6 NO<sub>x</sub> level.

### **Issue 2.3: Other Corporate Average Issues**

**COMMENT A:** Supports EPA's proposal to use the longer useful life standard. Two commenters note that section 202(i) of the CAA directs EPA to consider extending the useful lives of the LDV and LDT emission standards. Increasing the useful life of cars to 120K miles is a significant step in the right direction. However, a growing number of cars and other LDVs have a longer useful life than this. Given the trend toward longer actual vehicle lives and increases in annual mileage, an extension of the regulatory useful life requirements appears reasonable. **(American Lung Association (IV-D-167), p. 4, Appalachian Mountain Club (IV-D-251), Maine Dept. of Environmental Protection (IV-D-177), NESCAUM (Philadelphia - Day 1) (IV-F-131), NESCAUM (IV-D-130), p. 4, STAPPA/ALAPCO (IV-D-67), p. 5-6, STAPPA/ALAPCO (IV-F-117), State of Connecticut, Dept. of Environmental Protection (IV-F-2), State of Wisconsin (IV-D-166))**

**RESPONSE:** We are finalizing 120,000 mile useful life requirements for Tier 2 LDV/LLDTs. However, as discussed elsewhere in this document, we are not applying mandatory 120,000 mile useful lives to interim LDV/LLDTs. HLDTs already have 120,000 mile useful lives. We are aware of the fraction of the fleet with mileage in excess of 120,000 miles. Consequently our proposal provides incentives to encourage manufacturers to adopt an optional 150,000 mile useful life. We did not propose, and are not finalizing, any mandatory extension of useful life beyond 120,000 miles. While, vehicles may exceed standards after 120,000 mile useful lives, we believe that controls designed for Tier 2 standards will continue to be effective beyond 120,000 miles. However, any efforts to increase mandatory useful life will need to be addressed in a future rulemaking.

**COMMENT B.1:** Supports only the longer 120K mile emissions standard. Supports the elimination of the 50,000 mile standard. By establishing a slightly tighter 50,000 mile standard, EPA makes the emissions reduction targets harder to achieve. Another unintended outcome of this type of standard is to allow the Alliance to design in deterioration after 50,000 miles. **(American Petroleum Institute (IV-D-114), p. 150) (Alliance of Automobile Manufacturers (IV-D-115), p. 44, 81, Detroit Diesel Corporation (IV-F-92), Detroit Diesel Corporation (IV-F-96), Detroit Diesel Corporation (Atlanta) (IV-F-132), Volkswagen of America, Inc. (IV-D-60), p. 8) (See other letter listed under Comment B.2 that follows.)**

**RESPONSE:** We are retaining the intermediate useful life standards as proposed in the NPRM but are providing some options that affect their applicability. Intermediate life standards provide a check on the deterioration of vehicle emissions and help to ensure that vehicles will remain under our full life standards. Where we have added bins, we are including intermediate life standards. We did not propose and are not finalizing intermediate life standards for bins having NO<sub>x</sub> values below 0.07 g/mi. Consistent with previous programs, we did not propose separate intermediate life standards for PM.

For our interim program in the final rule, we are making intermediate life standards optional for diesel vehicles certified to bin 10. Given the likely market share of diesel vehicles in the early years of our program, manufacturers will be able to defer diesels until the last year of any of our phase-ins. To allow diesel engines to meet the interim standards without low sulfur diesel fuel, we are finalizing a higher PM standard than we proposed for the top bin and we are also finalizing to exempt them from compliance with bin 10's intermediate life standards.

For all bins in both the interim and final program, we are making intermediate life standards optional in cases where the manufacturer elects to certify to an extended useful life requirement of 150,000 miles. Commenters argued that some vehicle technologies may have very flat deterioration curves, readily comply with Tier 2 standards at full life, yet have difficulty meeting the tighter intermediate life standards. This will provide an opportunity for manufacturers to certify those vehicles. We believe that certification of vehicles for longer useful lives is an important goal and that the extra effort manufacturers take to attain the longer useful life will provide us with greater assurance that the vehicles will meet standards through 120,000 miles. Thus, we believe it is reasonable to make intermediate life standards optional for these vehicles.

Our final bins are very closely aligned with California, except that we have added additional bins. Intermediate life standards provide a way of assuring greater emission reductions from vehicles in higher bins than would a single full life standard. For higher bins, this can be significant. We do not believe that our inclusion of intermediate life standards will increase the certification workload of manufacturers for most vehicles beyond current requirements, given that current requirements impose intermediate life standards on all light duty categories and given that manufacturers will have to meet intermediate life standards in the California LEV II program, and given the opportunities for carry over and carry across in our certification program. Further, as we note above, we have provided a way by which manufacturers can opt not to certify to them that is still protective of air quality.

**COMMENT B.2:** Requiring certification at both 50,000 and 120,000 considerably increases the workload for manufacturer testing, which is counter to the recent CAP 2000 certification streamlining efforts. **(Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 3)**

**RESPONSE:** As indicated above, we do not believe that our intermediate life standards will significantly increase manufacturer workload from current requirements. Current requirements impose intermediate life standards on all light duty categories and manufacturers will have to meet intermediate life standards for many vehicles in the California LEV II program. The availability of carryover certification from model year to model year also reduces any burden that intermediate life standards might pose. We also do not believe that intermediate life standards are counter to the CAP2000 streamlining efforts which were promulgated around existing programs which include intermediate life standards for LDVs and all categories of LDTs.

**COMMENT C:** EPA improperly proposes to expand the useful life period for certain vehicles to 10 years or 120K miles even though the CAA expressly states that their useful life is 10 years or 100K miles. Under Section 202(d), EPA may not promulgate useful life regulations for LDVs and LDTVs that exceed 10 yrs/100K miles. In addition, section 202(a)(1) states that any new emissions standards must comply with section 202(d). There is no language in section 202(i) that authorizes EPA to change the 202(d) useful-life period. EPA should not read the "more stringent" clause in section 202(i)(3)(C) to allow for the creation of both stricter standards and longer useful life periods singly or in combination with one another. Such a reading would ignore section 202(d)(1). By limiting useful life to 10 yrs/100K miles, Congress bounded EPA's ability to bring subjectivity into the vehicle certification process. **(General Motors Corporation (IV-D-209), vol. 1, p. 4, 44, 46)**

**RESPONSE:** Section 202(d) must be read together with other parts of Section 202. Section 202(d) allows for different useful lives where specified. Section 202(i)(1) specifically directs the Administrator in the Tier 2 study

...to consider other standards and useful life periods which are more stringent or less stringent than those set forth in table 3 [the Tier 2 default standards and useful life] ...

Section 202(i)(3)(C) then directs that the Administrator shall either promulgate the default standards and useful life periods or may promulgate "alternative standards (and useful life periods) ..." The commenter would read these references to alternative useful life periods out of the Act. These references were clearly designed to allow EPA to change the useful lives of these vehicles. Therefore, we believe our actions are consistent with the Clean Air Act.

**COMMENT D:** The 50K mile intermediate useful life standard of the proposed Tier 2 program would preclude certain engines from entering the marketplace in 2004. With respect to advanced technology, separate standards at 50K miles penalize technologies that may not deteriorate in a linear fashion such as diesel and hybrid vehicles. EPA should eliminate or adjust this standard. Navistar provides significant additional discussion regarding why the intermediate useful life standard is burdensome, unnecessary, and should be eliminated. Even with a 5 ppm fuel, EPA's proposed full (120,000 mile) useful life standards are a stretch for diesel engine manufacturers. The intermediate useful life standards are significantly more stringent than the full useful life requirements and even with a 5 ppm fuel cannot feasibly be met by Navistar by the interim and Tier 2 target dates with existing and foreseeable control technology. Navistar notes that diesel LDVs/LLDTs and HLDTs are expressly exempted from intermediate (50,000 mile) useful life NO<sub>x</sub> standards under the Tier 1 standards and that there is no reason to believe that introduction of after treatment technology will compromise long-term emissions performance from light duty diesel vehicles. Assuming fuel sulfur is reduced to 5 ppm, there will be inherently less deterioration over time in a diesel system as compared to a gasoline system. In addition, durability-related concerns will be addressed under EPA's CAP 2000 program, since manufacturers will be required to design a durability process that predicts the in-use deterioration of the vehicles it produces and to test customer-owned in-use vehicles that are approximately one and four years old. EPA's CAP 2000 program will provide regulatory certainty that the light duty diesel vehicles certified to meet the interim and full Tier 2 standards in fact meet those standards over the full useful life of the vehicle. Therefore, EPA's proposed intermediate standards do not serve a legitimate compliance assurance purpose and are thus unnecessary. (**Alliance of Automobile Manufacturers (IV-D-115), p. 44, Cummins Engine Company, Inc. (IV-D-132), p. 8-9, 17-18, Cummins Engine Company, Inc. (IV-F-32), Detroit Diesel Corporation (IV-D-52), p. 2-3, Detroit Diesel Corporation (Atlanta) (IV-F-132), Engine Manufacturers Association (IV-D-71), p. 14-15, Ford Motor Company (Philadelphia - Day 1) (IV-F-131), Marathon Ashland Petroleum LLC (IV-D-81), p. 68, Navistar International Transportation Corporation (IV-F-12), Navistar International Transportation Corp. (IV-D-50), p. 3, 18-20, Navistar International Transportation Corporation (Atlanta) (IV-F-132), Volkswagen of America, Inc. (IV-D-60), p. 8**)

**RESPONSE:** As we have stated in our preamble and in these responses, we believe the same standards should apply to both diesel and gasoline vehicles. However, in our final rule, intermediate life standards will be optional for diesel vehicles certified to bin 10

during the interim program. This special case is discussed in our response to Issue 2.3.B.1 above. Further, we believe that given low sulfur fuel—as this final rule provides for gasoline and our forthcoming rules will propose for diesel—both gasoline and diesel vehicles will be able to meet all of our interim and Tier 2 standards, including intermediate life standards. Hybrid vehicles will likely be certified to bins below  $\text{NO}_x = 0.07 \text{ g/mi}$  where intermediate life standards were not proposed and are not being finalized. As explained in our response to Issue 2.3.B.1 above, we believe that intermediate life standards provide additional margins of emission control which can be significant for vehicles certified to higher bins. These intermediate life standards are readily attainable by gasoline vehicles and to create across-the-board exemptions for another fuel contradicts one of the key principals of the Tier 2 program—to impose the same standards regardless of fuel type. Furthermore, while it is arguable that emissions from diesel engines without aftertreatment will be less likely to deteriorate in use than gasoline vehicles, this is not likely the case for those with  $\text{PM}/\text{NO}_x$  aftertreatment. Since we expect widespread use of aftertreatment in 2007 and later, retaining the intermediate life standards is appropriate. Nevertheless, for reasons we describe in detail in our response to comment 2.3.B.1 we are including a provision that will permit manufacturers to opt out of intermediate life standards if they certify to a full useful life of 150,000 miles.

**COMMENT E.1:** EPA should incorporate an  $\text{NMOG} + \text{NO}_x$  averaging system as an alternative to the proposed  $\text{NO}_x$  average. This would provide greater flexibility for manufacturers and/or would help lower HC emissions. Under a purely  $\text{NO}_x$ -based plan, a manufacturer may be unable to introduce a vehicle with exceptionally low  $\text{NMOG}$  emissions but slightly higher  $\text{NO}_x$  emissions. Under a plan based on  $\text{NMOG} + \text{NO}_x$ , the same vehicle could be introduced. An optional certification process based on a combined standard would greatly improve the ability of manufacturers to introduce "next generation" vehicles. Two other commenters recommend that EPA add a  $\text{NMOG}$  standard in addition to the  $\text{NO}_x$  standard. (**Alliance of Automobile Manufacturers (IV-D-115), p. 58, American Lung Association (IV-D-167), p. 9, STAPPA/ALAPCO (IV-D-67), p. 9**)

**RESPONSE:** We are finalizing our proposal to base the Tier 2 and interim programs around the concept of a fleet average  $\text{NO}_x$  requirement. The Alliance's arguments seem to suggest that either the bins are too stringent when  $\text{NMOG}$  and  $\text{NO}_x$  are considered together or that the proposed bin structure penalizes vehicles that are certified slightly over the  $\text{NO}_x$  limit for a certain bin. We agree that for very clean vehicles there are  $\text{NMOG}$  and  $\text{NO}_x$  trade-offs, however these are manageable calibration and design issues. Furthermore, our final rule contains additional bins (two suggested, in fact, by the Alliance) which help to address this concern. Further, we are concerned that the use of an  $\text{NMOG} + \text{NO}_x$  standard would lead to a decrease in program stringency for  $\text{NO}_x$ , which is the focus of this rulemaking. Lastly, as we indicated in the preamble to the NPRM, the inclusion of a corporate average  $\text{NMOG}$  standard is not necessary because our  $\text{NO}_x$  average standard and bin structure will also drive average  $\text{NMOG}$  levels lower. The substitution of a corporate average  $\text{NMOG}$  standard could be used to drive  $\text{NO}_x$  levels but the use of the average  $\text{NO}_x$  standard is more consistent with our  $\text{NO}_x$  focus in this rulemaking.

**COMMENT F:** EPA should not adopt a  $\text{NMOG} + \text{NO}_x$  emission standard because it could significantly diminish reductions in  $\text{NO}_x$  emissions. (**California Air Resources Board (IV-D-271), p. 1**)

**RESPONSE:** We did not propose and are not finalizing an NMOG+NO<sub>x</sub> average emission standard. We agree with this comment.

**COMMENT G:** EPA should not impose more stringent standards (i.e., 0.05 g/mi NO<sub>x</sub>) for the 2011-12 timeframe. It is too early to determine whether additional reductions are necessary or feasible. **(Alliance of Automobile Manufacturers (IV-D-115), p. 70-71, Volkswagen of America, Inc. (IV-D-60), p. 6-7)**

**RESPONSE:** While we believe that the standards we are finalizing are feasible in the relevant timeframes, we are not finalizing further reductions beyond what we proposed in the NPRM.

**COMMENT H:** Supports use of corporate fleet average. Properly designed, the concept of an average can encourage and allow for cleaner technologies, as well as provide flexibility to the manufacturers. **(Maine Dept. of Environmental Protection (IV-D-177), Mitsubishi Motors R&D of America, Inc. (IV-D-127), Ozone Transport Commission (IV-D-112), p. 3)**

**RESPONSE:** We agree that averaging-based standards provide flexibility to manufacturers and can provide incentives for cleaner technologies. We requested comment on the use of a declining average standard like California uses for NO<sub>x</sub>, but we are not finalizing such a standard.

**COMMENT I:** Opposes use of corporate fleet average. Generally believes this approach allows manufacturers to produce dirtier vehicles. Also, EPA's proposal is much more complex than the successful CA averaging program. **(American Lung Association of New Jersey (IV-D-211), Clean Cars Coalition (228 signers - partial list) (IV-D-246))**

**RESPONSE:** Many EPA programs use corporate average standards. We do not believe these average standards allow manufacturers to produce dirtier vehicles on average. In fact, we believe the inclusion of averaging schemes allows us to promulgate tighter standards sooner and in a more cost effective manner.

Under an averaging scheme, a manufacturer may be able to continue production of some older technology vehicles whose emissions exceed the average standard, but it will have to offset those vehicles with other vehicles that are below the average standard. Since the environment "sees" the average emissions, there is no adverse effect of the higher emitting vehicles. Averaging standards promote more cost effective implementation because a manufacturer can apply its capital to those vehicles from which it can get the most cost effective reductions or to those vehicles which have the longest remaining production lives. Averaging standards provide a way for EPA to impose tough emission standards on manufacturers, yet accommodate the realities of product life cycles, the demands of niche markets and the limitations of manufacturers to reengineer all of their products in a short period of time.

**COMMENT J:** Opposes the 120k mile emissions standard. The requirement that vehicles have a useful life of 120k miles, during which period vehicle manufacturers are formally responsible for the vehicles' emission performance, reduces consumer responsibility for maintaining their vehicles. Manufacturers must design vehicles with



emissions significantly lower than the standard to ensure that after a decade of use under conditions over which manufacturers have no control, emissions still remain below the standard. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 18)**

**RESPONSE:** The requirement that manufacturers warrant vehicles to comply with emission requirements for their full useful lives comes directly from section 207(a) of the Clean Air Act. We believe it is far more cost effective to set reasonable useful life periods for which the manufacturer is responsible than it is to set shorter useful lives leading to less durable designs, and then depend on individual owners to repair emission control systems. In many cases, owners may not perceive a noticeable impact on driveability or performance or have other cause to seek repair when emissions systems fail.

### **ISSUE 3: BINS**

#### **Issue 3.1: Elimination of Bins**

**COMMENT A.1:** The top bin(s) are too lenient and would allow too much pollution - particularly from diesel engines. These bins should be eliminated and/or the standards within the bins should be more stringent. One commenter added that, in a demonstration program conducted by MECA manufacturers, a Chevy Silverado was able to achieve emission reductions 35 percent below the fleet average. There is no reason to allow higher categories for these heavier vehicles. **(20/20 Vision (IV-F-38), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (IV-D-167), p. 7, American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association of Gulfcoast Florida (IV-D-108), American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of NY (Philadelphia - Day 1) (IV-F-131), American Lung Association of New Jersey (IV-D-211), American Lung Association of Ohio (IV-F-65), American Lung Association of Santa Clara-San Benito (IV-D-106), American Lung Association of South Dakota (IV-D-94), American Lung Association, et. al. (IV-D-98), California Air Resources Board (IV-F-126), Campaign on Auto Pollution (IV-F-44), Chicago Department of the Environment (IV-D-200), p. 2, Clean Air Conservancy (IV-F-75), Clean Air Network, et. al. (IV-F-95), Fund for Public Interest Research (Atlanta) (IV-F-132), GA House of Representatives (Atlanta) (IV-F-132), Goldin, L.J. (IV-D-39), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Maine Dept. of Environmental Protection (IV-D-177), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 4, Montgomery Intercounty Connector Coalition, Inc. (IV-D-41), NJ Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), New Hampshire Dept. of Environmental Services (IV-D-163), NESCAUM (IV-D-130), p. 6, Ohio Public Interest Research Group (IV-F-98), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Physicians for Social Responsibility (IV-D-194), Puget Sound Air Pollution Control Agency (IV-D-138), STAPPA/ALAPCO (IV-D-67), p. 4-5, 9; att. 2, p. 3, STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Sierra Club (IV-F-14), Sierra Club (IV-F-3), Sierra Club (IV-F-49), Sierra Club, Maryland Chapter (IV-F-53), Tomaka, Tom (Atlanta) (IV-F-132), Township of Springfield (IV-D-105), U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (IV-F-55), U.S. Public Interest Research Group (Cleveland) (IV-F-134), Washington State Dept. of Ecology (IV-D-175)) (See other letters listed under Comments A.2 through A.8 that follow.)**

**RESPONSE:** Our program is designed to provide significant flexibility to manufacturers to apply emission control technologies to LDVs and LDTs on a cost effective basis. To that end we are finalizing a wide array of bins subject to a mandatory fleet average standard of 0.07 g/mi NO<sub>x</sub> at full useful life. In theory, with an averaging standard, it would not matter how high the highest bin is, because the average vehicle seen by the environment would be at 0.07 g/mi or less. The higher bins will not be heavily used, because for each vehicle using one of those bins, many more will have to be built below 0.07 g/mi to offset its high emissions. We therefore generally do not agree that higher bins allow too much pollution. While we are aware of data indicating manufacturers can meet or surpass the 0.07 g/mi standard now, we aim to provide a system which allows them to most cost-effectively apply technologies to all of their vehicles. That is what our system of bins does.

Our highest bin in the final Tier 2 program has a full useful life NO<sub>x</sub> value of 0.20 g/mi.

We are not providing higher bins than that because we do not believe they will be technologically necessary or practically useful and because we believe manufacturers should be focusing, in the long term, on applying new technologies to all of their vehicles. Further, we do not wish to risk a situation where a manufacturer could accumulate or buy up NO<sub>x</sub> credits and then use them to produce a group of high emitting vehicles.

With regard to diesel vehicles, we recognize that our highest bins may be used most frequently for diesels. However, the need to offset vehicles in those bins with vehicles below 0.07 g/mi NO<sub>x</sub> will effectively limit the number that can be produced in the higher bins. Manufacturers desiring to produce larger numbers of diesel fueled vehicles will have to develop cleaner diesel technologies so that those vehicles can use lower bins. Thus, our system of bins will enable diesels to remain a viable option yet permit a pathway for greater diesel penetration only to the extent that they can be built to lower bins.

**COMMENTS A.2 - .8:** Commenters recommend the following specific changes or deletions of bins: (1) In considering VOC and/or CO benefits, EPA should eliminate bin number 5 and tighten the NMOG standards for bins numbers 3, 6, and 7. EPA should eliminate bins 6 and 7 or tighten the standards within these bins. A state with a high percentage of new vehicle sales consisting of vehicles certified to bins 6 and 7 will not achieve a 0.07 g/m fleet average. EPA should consider some safeguards to ensure that capricious market forces and fluctuations in a state's mix of new vehicle sales do not impair state-specific air quality goals. (2) EPA should eliminate bin number 5. One commenter notes that elimination of this bin would ensure that bin 4 contains more engine families than any other bin and would guarantee an average 60 percent emission reduction for NMOG and a 50 percent for CO, while achieving the proposed NO<sub>x</sub> reductions. (3) Tier 2 should include a more stringent NMOG standard or bin 7 should be eliminated. (4) EPA should eliminate bins 6 and 7. One commenter provided an analysis of potential increases in diesel vehicle sales to document the significant increase in PM-10 emissions that could result from the proposed Bins 6 and 7. (5) Bin 7 should be eliminated. [Bin numbers here refer to bin numbers in the NPRM which do not match those of the final rule due to the addition of new bins, and the inclusion of all bins on a common chart] **(American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Appalachian Mountain Club (IV-D-251), California Air Resources Board (IV-D-271), p. 1, International Center for Technology Assessment (IV-D-122), p. 4-5, Maine Dept. of Environmental Protection (IV-D-177), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 4, NESCAUM (IV-D-130), p. 4, New Hampshire Dept. of Environmental Services (IV-D-163), Ozone Transport Commission (IV-D-112), p. 3, Puget Sound Air Pollution Control Agency (IV-D-138), Union of Concerned Scientists (IV-D-195), p. 1, 9-11, Washington State Dept. of Ecology (IV-D-175))**

**RESPONSE:** Our proposed bin structure was not intended to achieve NMOG standards for LDVs and LDTs below those of the NLEV program. Our proposed bins were set up so that a group of vehicles meeting 0.07 g/mi NO<sub>x</sub> would attain NMOG emissions of approximately 0.090 g/mi. As the focus of our proposal and final rule is NO<sub>x</sub>, it was not our goal to push average NMOG emissions below NLEV values (LEV values from Cal LEV II for HLDTs). Nonetheless, we believe that any practical response to the averaging program will bring actual NMOG emissions less than 0.09 g/mi.

Our final bin structure eliminates bin 5 (0.07 g/mi NO<sub>x</sub> with 0.055 NMOG) from the NPRM. This bin was initially included out of a desire to harmonize wherever possible

with the California program. We no longer believe that bin is necessary for harmonization purposes because manufacturers using that bin in the California program can simply use what was bin 5 in the NPRM and is now bin 5 (0.07 g/mi NO<sub>x</sub> with 0.090 NMOG). We are adding one bin, bin 6 in our new structure to enhance flexibility and to eliminate the rather large penalty that the NPRM structure would have imposed upon a manufacturer who couldn't quite certify to 0.07 g/mi NO<sub>x</sub>. We are also adding a bin with NO<sub>x</sub>=0.03 g/mi (bin 3) to enhance flexibility and encourage manufacturers to certify to lower bins. The number of vehicles in the higher bins is practically limited by the requirement to comply with the fleet average standard. Since the environment "sees" the average, we expect a relatively uniform dispersal of benefits within a state.

We are not eliminating any of the higher bins from the NPRM as suggested by some commenters. We see no risk of a concentration of vehicles certified to higher bins being sold in a particular geographic area. We are aware of no data to support a concern that "capricious market forces" might align to lead to a disproportionate concentration of vehicles from higher bins in any geographical area.

**COMMENT B:** EPA should not compromise the fuel-neutral standards to accommodate greater NO<sub>x</sub> and PM<sub>2.5</sub> emissions from diesel engines. (**American Lung Association (IV-D-167), p. 7, Bell, S. (IV-F-89), STAPPA/ALAPCO (IV-D-67), p. 4-5, 9; att. 2, p. 3, STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), Sierra Club, Southwest Region (Denver) (IV-F-133), Tennessee Environmental Council (Atlanta) (IV-F-132), Union of Concerned Scientists (IV-D-195), p. 1, 8-9, Union of Concerned Scientists (IV-F-88)**)

**RESPONSE:** Our final Tier 2 bins will allow diesels with advanced technology to be sold, but if those diesels are concentrated in the upper bins, then their sales will necessarily be constrained. In order to increase sales of diesels, manufacturers will have to reduce their emissions to get them into lower bins.

Diesels are unlikely to be phased into either our Tier 2 program for LDV/LLDTs or our interim program for HLDTs until 2006 or 2007 because they will be small in number and it will be difficult for them to meet our standards on current fuels. In our interim program, we are providing a slightly higher top PM standard than we proposed, and making intermediate life standards optional for the same bin. This is to allow diesels to comply on existing fuels in the interim program. See also our response to comment 2.3.B.1.

**COMMENT C:** All diesel vehicles should be required to meet the same standards as other vehicles. In certain cases, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was over 3,500. (**American Lung Association (IV-D-167), p. 3, 7, American Lung Association (Philadelphia - Day 2) (IV-F-131), American Lung Association (Atlanta) (IV-F-132), American Lung Association of Georgia (IV-F-13), American Lung Association of Michigan (IV-F-94), Clean Air Council (IV-F-28), Clean Air Network, et. al. (IV-F-95), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Climate Solutions (IV-D-279), Earth Day Coalition (IV-F-82), EcoCity Cleveland (IV-F-84), Englebrecht, Erin (Atlanta) (IV-F-132), Environmental Defense Fund (IV-D-174), p. 14, Environmental Health Watch (IV-F-81), Fletcher, Robert E. (Atlanta) (IV-F-132), Galik, D.S. (IV-F-79), Glassroth, J., et. al. [587 individuals] (IV-D-227), Gutierrez, R. (IV-D-55), International Center for Technology Assessment (IV-D-122), p. 4-5, International Center for Technology Assessment (IV-D-182), Kauffman, W. (IV-D-212), Kostmeyer, Peter (IV-F-27), Lancaster**)

Greens (IV-F-29), Lancaster Greens (Philadelphia - Day 2) (IV-F-131), Langon, John (Philadelphia - Day 2) (IV-F-131), Michigan Environment Council (IV-F-105), Miller, J.C. (IV-F-71), Montgomery Intercounty Connector Coalition, Inc. (Philadelphia - Day 1) (IV-F-131), Mountcastle, Brooks (Philadelphia - Day 2) (IV-F-131), Multiple Private Citizens (IV-D-1, 2, 6, 7, 9, 12, 15, 16, 22, 27, 29-31, 33, 144, 145, 160, 161, 172, 184, 230, 247, 248, 263, and 267-269), NE Ohio Emapct Project (IV-F-80), National Environmental Trust (IV-F-26), Ohio Lung Association (Cleveland) (IV-F-134), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Phan, Kimmy (Atlanta) (IV-F-132), Ray, C. (IV-F-101), Robinson, Linda (Cleveland) (IV-F-134), Rohm and Haas, Agricultural Chemicals Division (IV-F-25), Rollins, Rebecca (Cleveland) (IV-F-134), SC Coastal Conservation League (IV-D-260), STAPPA/ALAPCO (IV-D-67), p. 4-5, 9; att. 2, p. 3, Sierra Club (IV-D-46), Sierra Club - Northeastern OH (Cleveland) (IV-F-134), Sierra Club, Northeast Ohio Group (IV-F-103), Sierra Club, PA Chapter (IV-D-215), Sierra Club, Pennsylvania Chapter (IV-F-37), State PIRG Petitions (IV-D-241 and 249), Tennessee Environmental Council (Atlanta) (IV-F-132), Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), Trepal, C. (IV-F-109), U.S. Public Interest Research Group (Atlanta) (IV-F-132), Voicemail Transcript Reports (IV-D-34, 35, 235, 237, and 238), Wyncote Audubon Society (IV-F-8))

**RESPONSE:** We proposed and are finalizing a requirement that all vehicles, regardless of fuel type, will have to meet the same standards, i.e. use the same bins and average together to meet one average NO<sub>x</sub> standard. See also our response to issues 3.1.A.1-.8 and 3.1.B above.

**COMMENT D:** There should only be a limited number of NMOG, NO<sub>x</sub>, and PM emission standards (bins). EPA should consider providing only four bins to be consistent with California's program and to reduce administrative difficulties. Commenters concerned about bin 3, which includes a higher NMOG standard than bin 4, and finds that if bin 5 were eliminated while retaining the 0.07 g/m NO<sub>x</sub> standard, NMOG exhaust emissions would more closely approach those which could be achieved with LEV 2. (**American Lung Association (IV-D-167), p. 7-8, International Center for Technology Assessment (IV-D-122), p. 6, STAPPA/ALAPCO (IV-D-67), p. 4-5, 9**)

**RESPONSE:** As we have indicated in response to other comments in this document, our final Tier 2 program contains two additional bin beyond those of the NPRM. Additional bins provide more flexibility for manufacturers but do not impact air quality since manufacturers are constrained in their bin choices by the need to comply with the corporate average NO<sub>x</sub> standard. Our choice of NMOG values generally harmonizes with California's values, but we have dropped bins from the final rule that are present in the California program only to provide additional credit for test groups certified to lower NMOG levels. When a manufacturer meets the 0.07 g/mi NO<sub>x</sub> standard, our bin structure will result in an NMOG level equal to or less than that for California LEV vehicles (0.09 g/mi). As we said in response to other comments, it was not the intention of our Tier 2 rule to reduce hydrocarbons below that level. There are no additional administrative difficulties associated with having more bins than California.

**COMMENT E:** A high number of bins may lead to an unequal distribution of vehicles (and therefore unequal distribution of air quality benefits), since the proposed fleet average system does not incorporate any regional averages. (**Pennsylvania Dept. of**

**Environmental Protection (IV-D-69), p. 2)**

**RESPONSE:** As we indicated in response to Issue 3.1.A.2-8, we are not aware of any situations in which significant quantities of vehicles certified to higher bins can be expected to be sold in a particular geographic area. If such a phenomenon were to occur, it would not be because of any extra bins we have included in our final program. We note again that the use of higher bins will necessarily be constrained by the need to comply with the corporate average NO<sub>x</sub> standard.

### Issue 3.2: Additional Bins

**COMMENT A.1:** EPA should expand the number of certification bins to provide additional flexibility for vehicle manufacturers, encourage the development and use of advanced/fuel-efficient technologies, and address the needs of heavier vehicles with large displacement engines. EPA should adopt the Alliance proposal, which provides 10 bins for NO<sub>x</sub> and PM (with the highest - bin 10 - being discontinued in 2008 MY). AAM offers significant supporting details to support its argument that EPA should adopt this approach. (**Alliance of Automobile Manufacturers (IV-D-115), p. 67-69, Alliance of Automobile Manufacturers (IV-F-76), Alliance of Automobile Manufacturers (Atlanta) (IV-F-132), Alliance of Automobile Manufacturers (Denver) (IV-F-133), Alliance of Automobile Manufacturers (Cleveland) (IV-F-134), Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 1-2, Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), Cummins Engine Company, Inc. (IV-D-132), p. 12-17, Detroit Diesel Corporation (IV-D-52), p. 4, Detroit Diesel Corporation (Atlanta) (IV-F-132), Detroit Diesel Corporation (IV-F-92), Detroit Diesel Corporation (IV-F-96), Ford Motor Company (Philadelphia - Day 1) (IV-F-131), General Motors (Philadelphia - Day 1) (IV-F-131), National Automobile Dealers Association (IV-D-129), p. 2, Volkswagen of America, Inc. (IV-F-54), Volkswagen of America, Inc. (IV-D-60), p. 3-4)) (See other letters listed under Comments A.2, A.3 and Comment B that follow.)**

**RESPONSE:** We have added a bin at the level of NO<sub>x</sub> = 0.10 at the suggestion of the Alliance. Also, we have added a bin with a NO<sub>x</sub> value of 0.03 g/mi to further enhance flexibility and encourage manufacturers to certify vehicles to lower bins. See preamble discussion for tables of standards and details.

**COMMENTS A.2 - .3, and B:** Navistar provides significant discussion on this issue and notes that the proposed bin approach will foreclose the ability of vehicle manufacturers to certify diesel LDVs/LDTs at the higher bin levels and that EPA should adopt the bin proposal recommended by EMA. Navistar provides specific examples to illustrate their position on this issue. The bin proposal recommended by EMA would greatly expand the number of bins above and below the benchmark level, and thus provide manufacturers with needed compliance flexibility. Emissions averaging under EMA's approach would not compromise emission reduction targets since the interim and full Tier 2 emissions averages must always be met on a fleet wide basis. EMA's approach should result in even greater reductions than EPA's proposal, since EMA's proposal creates a clear incentive to identify and develop technologies that enable manufacturers to make small but significant emissions reduction changes. EMA's proposal eliminates the wide emissions gaps under EPA's proposal, creates more bins to which test groups could be certified, and provides additional credit to manufacturers that develop technologies that meet a lower and certifiable bin level. EPA should provide a bin for every 0.01 g/mi. increment in NO<sub>x</sub> emissions. Such a bin system would afford true and effective flexibility without penalty. Thus, to the extent that any vehicle was below the interim or Tier 2 average NO<sub>x</sub> benchmark, it would generate credits that could be used to help certify vehicles above the applicable benchmark. For example, if a manufacturer had a configuration with a NO<sub>x</sub> emission level of 0.09 g/mi. and another configuration of equal sales volume with a NO<sub>x</sub> emission level of 0.05 g/mi., that manufacturer's engines and vehicles could (and should) be certified, with no disadvantage to the overall emissions inventory or the environment. EPA should implement an averaging program that allows the setting of family emission limits, which would provide additional flexibility to

manufacturers. Gaps between the five Interim bins and seven Tier 2 bins discourage emission reductions that are significant but that fall short of the next lower bin.

**(Cummins Engine Company (Atlanta) (IV-F-871), Cummins Engine Company, Inc. (IV-D-132), p. 12-17, Cummins Engine Company, Inc. (IV-F-32), Engine Manufacturers Association (IV-D-71), p. 3, 19-21, Navistar International Transportation Corp. (IV-D-50), p. 3-4, 20-22))**

**RESPONSE:** EMA's comments essentially propose a system that is based on Family Emission Limits (FELs) rather than bins. An FEL based system essentially provides a continuum of bins, usually subject to a mandated cap or "upper limit". We have implemented a number of programs based upon FELs. Indeed, our heavy-duty engine standards use an FEL-based system. We believe that a bin system is a more appropriate approach for these vehicles (and may even be more appropriate for those programs where we currently use FELs). While an FEL-based system provides considerable flexibility to manufacturers to lower the FEL of a test group as improvements in technology are made, our experience has been that manufacturers routinely make FEL reductions (or increases), not because of advances in engine technology, but rather because of their need for credits balanced by their concern about EPA compliance programs (i.e. Selective Enforcement Auditing).

We do not agree that a bins-based system discourages technological advancement. We believe that properly spaced bins provide stretch goals to encourage and provide benefit for quantum leaps in technology. An FEL-based system, on the other hand, encourages fine-tuning and "tweaking" of calibrations for minor benefits, or simply the reduction in compliance margins to optimize credits.

We have implemented a number of changes in the final rule which we believe will address the fundamental concerns of these commenters. First, we have added some additional bins as discussed above. Also, due to concerns about the widespread availability of low sulfur diesel fuel in years before 2007, we have made compliance with intermediate life standards for bin 10 optional for diesel engines, and included slightly higher in-use standards for vehicles certified to that bin. Also we have provided an option under which intermediate life standards would be optional for all vehicles the manufacturer certifies to a full useful life of 150,000 miles. See Issue 2.3.B.1.

Lastly, we have received an abundance of comments from industry and other groups imploring us to harmonize to the extent possible with California, which uses a bins-based program.

We received a number of comments in support of a bins approach over an FEL approach. See Issues 3.2.E and 3.3.G.

**COMMENT C:** EPA should include additional certification bins that allow individual vehicles to meet NO<sub>x</sub> levels of up to 0.6 g/mi at least through the 2007 model year and 0.4 g/mi thereafter. **(Volkswagen of America, Inc. (IV-F-54))**

**RESPONSE:** Under our final program, interim LDV/LLDTs may utilize a bin having a NO<sub>x</sub> value of 0.60 g/mi through 2006. HLDTs may utilize this bin through 2008. We have not added a bin with a NO<sub>x</sub> value of 0.40 g/mi. We are retaining 0.20 g/mi as the NO<sub>x</sub> value for our highest bin in the final Tier 2 program. Given the need to meet a 0.07 g/mi NO<sub>x</sub> average standard, we do not believe that bins above that level are technologically



necessary or practically useful. We believe that manufacturers commenting in favor of higher bins are doing so because of a desire to have bins that will accommodate diesels without requiring advanced technologies to be applied. While the extra NO<sub>x</sub> emissions from vehicles certified to such bins could be offset in our averaging scheme, the likely increase in diesel PM emissions would not. (The 0.4 bin referred to in the comment also carries a 0.04 g/mi PM standard.) We do not believe it is appropriate to finalize a bin structure that could lead to increases in diesel PM emissions from LDVs and LDTs. Our final bin structure is described in detail in the preamble.

**COMMENT D:** [Reserved] [See Comment A, above.]

**COMMENT E:** Use of a family emission limit (FEL) compliance approach has the potential to provide some flexibility. However, any benefit that may be realized using FELs is outweighed by the complexity added to the in-use testing requirements under the CAP 2000 program. **(Volkswagen of America, Inc. (IV-D-60), p. 8**

**RESPONSE:** We agree with this comment. As we indicated in other responses above we have concerns about FEL-based programs. We are not finalizing an FEL-based program.

**COMMENT F:** The FEL approach appears to be more cost effective and to offer more incentives for innovation than the bin approach, although it also adds constraints on manufacturer production and pricing policies which, when combined with CAFE constraints, may be daunting and have unintended effects. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 20-21)**

**RESPONSE:** We address our concerns about FEL-based programs in detail above. We believe that our final bin structure provides considerable incentive for innovation. This commenter's concerns about the combined impacts of an emission averaging program with CAFE requirements are not presented in sufficient detail for us to respond to. However, we believe—and the text in the actual comment seems to suggest—that there would be little difference in those concerns whether an FEL or bins-based program was employed.

**COMMENT G:** Opposes additional higher bins for PNGV vehicles. Increased fuel economy should not be achieved at a cost of increased ozone /PM levels, and higher bins make no sense given that the current high emission level bin is already scheduled to be phased out. **(American Petroleum Institute (IV-D-114), p. 151, Marathon Ashland Petroleum LLC (IV-D-81), p. 70)**

**RESPONSE:** Our final bin structure was not designed to specifically "permit" any one technology that might require higher bins. Our final structure will accommodate a range of technologies but will limit sales of any existing or new technology that must use a higher bin. Further, as we have stated before, our final bin structure actually creates a pathway for such technologies whereby they can use higher bins at very low volumes, but the system provides incentive for emission reduction if the manufacturer wishes to sell greater volumes. If a technology is such that it is not cost effective to move it to a lower bin, then the system provides incentive for the manufacturer to apply advanced or

additional technology to a different group of vehicles to obtain offsetting emission reductions. Either way, our system provides incentive for emission reductions and the development of new technology.

**COMMENT H:** EPA should include additional bins that allow for up to 0.3 g/mi NO<sub>x</sub> and 0.03 g/mi PM to allow for diesel engines to meet Tier 2 standards. **(Cummins Engine Company, Inc. (IV-D-132), p. 7, 17)**

**RESPONSE:** Our final rule does not include this bin. Our highest bin for the final Tier 2 program remains as proposed at 0.20 g/mi NO<sub>x</sub> and 0.02 g/mi PM. We believe this bin will be attainable by advanced technology diesel vehicles if low sulfur fuel is made available. Therefore, the additional bin would not be necessary for that purpose.

**COMMENT I:** Opposes the FEL approach because it adds unnecessary complexity to the certification and compliance monitoring process, and also would require establishing separate NO<sub>x</sub> and NMOG average standards. **(California Air Resources Board (IV-D-271), p. 2)**

**RESPONSE:** We are not finalizing an FEL-based program. We agree with this comment.

### **Issue 3.3: Different Values in Bins**

**COMMENT A:** Some of the emission standard bins are too lenient. **(STAPPA/ALAPCO (IV-F-117))**

**RESPONSE:** We discuss at great length in other points under Issue 3 that we believe our bin structure is appropriate. We note in numerous responses that it is the fleet average NO<sub>x</sub> standard that determines the emissions "seen" by the environment. While we have some bins that are more lenient than California's and obviously more lenient than this commenter likes, our system is such that the number of vehicles that can be sold for those higher bins is limited by the overarching NO<sub>x</sub> average standard.

**COMMENT B:** The proposed bin structure is invalid since EPA joins emissions levels for four different precursors representing three separate NAAQS. EPA cannot premise the regulation of one precursor on the fact that a different precursor must be controlled. If the need for any of those reductions is invalidated, the entire system must fail. GM cites to *City of Brookings Mun. Tele. Co. v. FCC*, 822 F.2d 1153, 1168 (D.C. Cir. 1987); *Office of Communication of the United Church of Christ v. FCC*, 779 F.2d 702, 707 (D.C. Cir. 1985). **(General Motors Corporation (IV-D-209), vol. 1, p. 52-53)**

**RESPONSE:** EPA agrees that it must have independent rationales for more stringent standards for all of the pollutants for which it is promulgating new standards. EPA has provided such independent rationales in this rule. Moreover, EPA does not agree that if the need for any of the standards is invalidated, (EPA, of course, does not believe that any will be so invalidated), then the whole bin system must fail. The standards are all independently justified and if one was found to be invalid, that would affect only the validity of that particular standard, not the remaining standards or the bin structure for the remaining standards.

**COMMENT C:** The standards of the additional bins (i.e., in addition to the CA LEV 2 program) are weak. **(STAPPA/ALAPCO (IV-D-67), p. 9, STAPPA/ALAPCO (IV-F-6))**

**RESPONSE:** See response to Issue 3.3.A above.

**COMMENT D:** Bin 3 is problematic because it includes a higher NMOG standard than bin 4. In considering VOC benefits, EPA should tighten the NMOG standards for bins numbers 3, 6, and 7. **(American Lung Association (IV-D-167), p. 7-8, International Center for Technology Assessment (IV-D-122), p. 6, New Hampshire Department of Environmental Services (IV-D-163), Ozone Transport Commission (IV-D-112), p. 3, STAPPA/ALAPCO (IV-D-67), p. 9, STAPPA/ALAPCO (IV-F-6))**

**RESPONSE:** This comment is addressed by responses under Issue 3.1.

**COMMENT E:** The standards included in the proposed bin system will discourage the development and use of lean burn vehicles. These vehicles will not be able to comply with even the most lenient values included in the proposed bins. Commenter provides detailed overview of the emission control options available for diesel engines and the difficulty in meeting the proposed standards. **(Cummins Engine Company, Inc. (IV-D-**

**132), p. 4-7, General Motors Corporation (IV-D-209))**

**RESPONSE:** As discussed above, EPA cannot jeopardize the emission reductions in this program to accommodate the higher emissions from diesel engines. However, we believe that diesel vehicles will be able to comply with our interim bins on currently available diesel fuel and that advanced technology diesels will be able to comply with the final Tier 2 bins if low sulfur diesel fuel becomes available. A bin as high as 0.6 NO<sub>x</sub> for the final Tier 2 standards would be of little use for manufacturers, given the considerable number of offsetting reductions manufacturers would need to provide for every 0.6 NO<sub>x</sub> vehicle.

**COMMENT F:** If a bin system is utilized, the VOC standard in bin 5 (0.09 g/mi) should be closer to the new generation of California vehicles - LEV II (0.062 g/mi). **(SC Department of Health and Environmental Control (IV-D-56), p. 2)**

**RESPONSE:** See responses to comments under Issue 3.1.

**COMMENT G:** Supports the use of defined sets of standards or bins as proposed by EPA instead of family emission limits. The bin approach has been used successfully by California in implementing the original LEV program adopted in 1990 and will be used to implement the LEV II program. By contrast, the HDE FEL system has been the source of considerable controversy since its introduction in the late 1980s. Allowing the manufacturers to pick their own standards creates an incentive to "game" the standards by certifying very close to the test levels and thereby reduce the margin of safety between the standards and the test levels. Also, every effort should be made to make the proposed program consistent with the California program. **(Manufacturers of Emission Controls Association (IV-D-64), p. 4)**

**RESPONSE:** We did not propose and are not finalizing an FEL-based program. We agree with this comment.

**COMMENT H:** The proposed bin structure would constrain efficiency and hinder innovation. The bin approach reduces manufacturers' flexibility, needlessly constrains the ratios of pollutants emitted, and encourages manufacturers to innovate to meet bin emission levels under EPA test conditions rather than to improve air quality. For example, once a vehicle met bin 4 (with a NO<sub>x</sub> standard of 0.07 g/mi.) manufacturers would have no incentive to introduce further controls to lower vehicle emissions to 0.06 g/mi. or 0.05 g/mi., because they would not get credit until they lowered emissions a full 0.03 g/mi. and thereby moved the vehicle into bin 3 (with a NO<sub>x</sub> standard of 0.04 g/mi). **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 19)**

**RESPONSE:** As we have indicated in numerous responses above under Issues 3.1 and 3.2, we have structured our bins program to provide considerable flexibility while at the same time providing incentive to manufacturers to develop and apply new technology. We believe the distances between bins provide incentive for real emission reductions. We do not agree that the bin structure needlessly constrains ratios between pollutants. The nature of motor vehicle emissions and their control is such that direct tradeoffs frequently occur between pollutants. A system is needed to assure that when a manufacturer reduces, say, NO<sub>x</sub> emissions, it does not do so in such a way that will raise

hydrocarbon and/or CO emissions. Thus the caps in each bin on all pollutants are necessary. Additionally, our bins are designed to harmonize as much as possible with California's. This was a desire and a major concern of the manufacturers.

#### ISSUE 4: INTERIM STANDARDS

**COMMENT A:** Questions whether the interim standard is going to push manufacturers to sell cleaner vehicles before 2006. **(Union of Concerned Scientists (IV-F-88))**

**RESPONSE:** Interim standards will force manufacturers to continue NLEV levels for interim LDVs and LLDTs in the 2004-2006 period. In addition, manufacturers will have to reduce the emissions of LDT2s or of all LDV/LLDTs on average to address the fact that we are not permitting a separate, higher corporate average NO<sub>x</sub> standard for LDT2s as is allowed under NLEV. Also, the interim standards will bring substantial reductions from HLDTs which will "come into" the interim program from relatively high Tier 1 levels.

**COMMENT B:** The proposed rule increases the stringency of the NO<sub>x</sub> standard for many of the 2004 MY and later vehicles which are not part of the Tier 2 phase-in. The standards for these vehicles should remain consistent with NLEV and CA LEV standards, which would allow manufacturers to focus on the interim and final Tier 2 standards. **(Ford Motor Company (Philadelphia - Day 1) (IV-F-131), General Motors (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** Our final bins align closely with those of the NLEV and Cal LEV programs. Plus we have added additional bins to enhance manufacturer flexibility. However, we are not allowing a separate higher NO<sub>x</sub> average standard for LDT2s in our interim program as manufacturers desire. We are also not finalizing a bin with a NO<sub>x</sub> value of 0.9 g/mi for the LDT4s as manufacturers desire, because we do not believe such a bin is needed.

Our final rule provides additional time beyond that in California for manufacturers to make their HLDTs comply with the Tier 2 standards. Manufacturers have insisted that these vehicles would be the most technologically challenging and require the greatest leadtime. To partly offset the foregone emission reductions from these vehicles, we proposed to align all LDV/LLDTs including LDT2s under a 0.3 g/mi NO<sub>x</sub> standard in the interim program. (LDT2s are only subject to a 0.5 g/mi NO<sub>x</sub> standard under the NLEV program.) We also proposed to cap HLDTs at 0.6 g/mi during the interim program while LDT4s under the Cal LEV program can use a bin with a NO<sub>x</sub> value of 0.9 g/mi through 2006. We received considerable criticism from manufacturers for these two deviations from the NLEV/Cal LEV programs.

We are still requiring that all interim LDV/LLDTs including LDT2s meet a NO<sub>x</sub> average standard of 0.30 g/mi. Applying the 0.30 g/mi average NO<sub>x</sub> standard to LDT2s as well as LDV/LDT1s provides significant NO<sub>x</sub> benefit in the early years of our program (approximately 47,000 tons in 2007; 54,000 tons in 2010) and is easily feasible for these vehicles.

With regard to the LDT4s, we do not believe that the 0.9 bin is necessary. We have noted elsewhere that our program provides manufacturers with more time to comply with the Tier 2 standards for HLDTs than does the California program, and we believe that such vehicles should meet tighter interim standards in exchange. Our review of certification data indicates that these interim trucks can easily certify to a bin having a NO<sub>x</sub> value of 0.60 g/mi, providing significant emission benefit. Comments seem to indicate that the primary reason manufacturers wanted a 0.9 bin was for its 0.12 g/mi PM (particulate matter) standard which would benefit diesels. As we have indicated in

other responses in this document, it is not our intent to establish bins to "permit" certain technologies that may require higher bins. This applies to the interim program as well as to the final program. Consequently, we are not adopting the manufacturers' recommendation for a 0.9/0.12 bin. For further discussion of the interim bins see the preamble discussion as well as other responses.

**COMMENTS C.1 - .2:** In choosing to terminate the NLEV standard at the end of the 2003 MY and establish a whole new regulatory program for these vehicles, EPA will create an enormous burden that will defeat the purpose of phasing-in the new Tier 2 standards. AAM provides significant data and discussion to support its position that EPA's proposal to terminate the NLEV program in 2003 and begin to subject these "phase-out" vehicles to interim LDV/LLDT standards will be too burdensome and is unnecessary, and that neither the industry nor EPA have the expert human and physical resources to handle the extra workload. AAM provides a detailed list of all of the requirements that would be imposed on manufacturers because of this requirement and asserts that due to the two-part phase-in structure, manufacturers will have to repeat most, if not all, of these steps over the phase-in periods through the 2009 MY. There are simply too few automotive engineers and certification facilities to permit re-engineering and re-certifying virtually the entire light-duty fleet in such a short time. EPA should recognize that its approach will create a certification logjam for both manufacturers and EPA. EPA should modify the non-Tier 2 provisions to use NLEV standards as the interim Tier 2 standards for LDVs and LDTs. In addition, EPA should adopt California LEV I MDV2 and MDV3 standards as the phase-out standards for LDT3s and LDT4s, respectively, and use them for the 2004 baseline from which the interim HLDT fleet average is phased-in. EPA should also require California exhaust and evaporative test fuels, evaporative durability test fuel and 4K mile SFTP standards until adequate data become available to justify changing them. **(Alliance of Automobile Manufacturers (IV-D-115), p. 48-51),**

EPA's proposal to apply interim non-Tier 2 standards is unreasonable and not necessary. The requirement for manufacturers to certify vehicles to the interim non-Tier 2 standards starting in 2004 creates an unnecessary and burdensome workload. The workload issue for both vehicle manufacturers and EPA could be avoided by adoption of the Alliance proposal. VW adds that the requirements for the interim non-Tier 2 vehicles would lead to changes from the NLEV program that would result in the following negative consequences: manufacturers would be placed in the position of having to re-certify entire product lines and possibly be required to re-engineer many, if not all, vehicle concepts; the phase-in from the interim non-Tier 2 standards to the Tier 2 standards would require another round of re-certification - all within a short 3-year timeframe; an unreasonable human resource and test facility burden would be imposed on the manufacturer; and the availability of 50-state vehicle concepts would be restricted or eliminated. EPA should revise the proposed requirements for the interim non-Tier 2 vehicles so that the program for these vehicles is consistent with the NLEV program for light-duty vehicles and light-duty trucks to allow for a true phase-in and smooth transition into the Tier 2 compliance requirements. **(DaimlerChrysler (IV-D-59), p. 3, Nissan North America, Inc. (IV-D-125), p. 4-5, Volkswagen of America, Inc. (IV-D-60), p. 7-8)**

**RESPONSE:** The issue of the "workload" associated with the proposed interim program was a major issue for manufacturers at the public hearings, in the written comments and in meetings with EPA. This issue is addressed in the preamble to the final rule. In summary, we proposed that, beginning in 2004, all LDV/LLDTs would need to certify to 120,000 mile useful life standards. We also proposed that HLDTs would have to begin

certifying at loaded vehicle weight (LVW) rather than the adjusted loaded vehicle weight (ALVW or "half payload") under which they are currently certified. Manufacturers made convincing presentations and arguments about the impact that these items would pose. Essentially, manufacturers argued that these two items alone would prevent any carryover certification from the 2003 model year and would necessitate 100% recertification in the 2004 model year. This would require more testing capacity and engineering staff than the manufacturers have available. Manufacturers argued that it was burdensome enough that, in 2004, 25% of their LDV/LLDTs would have to meet the Tier 2 standards and 25% of their HLDTs would have to meet the interim average NO<sub>x</sub> standards. Manufacturers argued further that the changes that would be required of the interim vehicles would be short lived since those vehicle would quickly be phased into the Tier 2 or interim program (HLDTs). They expressed strong concerns against diverting scarce engineering resources away from development of Tier 2 technologies and configurations to recertify old configurations to new interim requirements.

It was not our intention to design a program that would effectively limit carryover from 2003 into the interim programs and we believe the manufacturers have valid concerns. Consequently, in the final rule we will phase in the 120,000 mile useful life requirements as the Tier 2 vehicle are phased in. For the HLDTs, we will phase in the requirement to test at LVW as the Tier 2 HLDTs are phased in. There will be no significant air quality impacts due to these changes.

We have made other changes to address workload issues for the interim vehicles out of our belief that, where possible, we should allow carryover of certification from 2003 or from Cal LEV I and thereby reduce workload attached to the interim vehicles to enable manufacturers to better focus their efforts on complying with the Tier 2 standards. We have better harmonized our bins with California's (See Issues 2,3 and 4), and we have altered our proposal for full life Supplemental Federal Test Procedure (SFTP) standards (See Issue 8). None of these changes will have any significant air quality impacts.

Our agreement over carryover certification workload issues should not be confused with the manufacturers' request to replace the standards of our interim program with those from NLEV and the Cal LEV I MDV program. In the case of these standards, we do not agree, since the air quality benefits are linked to the level and the timing of the standards.

**COMMENT D:** EPA should set additional caps on PM beginning in 2004 or consider a declining diesel PM average to avoid potentially large PM emission increases during the phase-in period. EPA should also consider more stringent interim NO<sub>x</sub> standards. The PM emission increases could occur because the interim limits are not severe and windfall credits generated under ABT could allow for large sales of high-NO<sub>x</sub> vehicles. **(Union of Concerned Scientists (IV-D-195), p. 11)**

**RESPONSE:** As we have said in response to other issues above, diesels currently represent a very small portion of the light duty market, although their share is expected to grow. Our interim standards will be difficult for manufacturers to meet on available fuels. To the extent that manufacturers must use the higher bins to certify their diesels—which we think will be the case—then the sales of diesels will be tightly constrained by the requirement to meet the applicable NO<sub>x</sub> average standard.

With regard to the issue of windfall NO<sub>x</sub> credits during the interim program, we believe



that NO<sub>x</sub> credits will be difficult to generate in the interim program and that any credits generated will represent real environmental benefit. For HLDTs, manufacturers will need to implement emission reductions from the current high Tier 1 standards. Even if manufacturers were able to generate substantial NO<sub>x</sub> credits to offset higher NO<sub>x</sub> emissions of diesels, those diesels would still have to meet the PM standards in our interim program.

## **ISSUE 5: START DATE -VEHICLES**

**COMMENT A:** Generally supports the proposed start date. One commenter added that, to ensure that a cleaner Federal program will start in the 2004 model year, EPA must finalize the Tier 2 and gasoline sulfur program by the end of the calendar year. Any delay or substantive weakening of the programs will create uncertainties for achieving the emissions benefits and will therefore shift the burden of these emission reduction responsibilities back onto states. **(American Petroleum Institute (IV-D-114), p. 149, Environmental and Energy Study Institute (IV-D-283), Nissan North America, Inc. (IV-D-125), p. 2, Ozone Transport Commission (IV-D-112), p. 1 Ozone Transport Commission (IV-F-4), Puget Sound Air Pollution Control Agency (IV-D-138), Smith, Tom (IV-F-926))**

**RESPONSE:** Agency management and staff made every effort to complete this rulemaking process prior to December 31, 1999. Throughout the Tier 2 process, our goal has been to create a final program that can bring the soonest possible emission benefits to states. The issues involved in completing this rulemaking were many and complex. In the end, we believe that our final rule appropriately balances the needs of all stakeholders while still providing substantial and early air quality benefits.

**COMMENTS B.1 - .3:** The start date for vehicle standards should be sooner than proposed. The compliance deadline of 2007 for cars and 2009 for light duty trucks is too far away to help states comply with the 8-hour ozone standard. The technology is here today and the implementation schedule should be moved to 2003 for both cars and trucks or timeframes for required attainment demonstrations should be aligned with the timeframes provided in the final rule. One commenter noted that all LDVs, LDTs, and HLDTs should be in full compliance by 2006. In certain cases, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was approximately 670. **(American Lung Association of Ohio (IV-F-65), American Lung Association of Santa Clara-San Benito (IV-D-106), American Lung Association, et. al. (IV-D-98), Appalachian Mountain Club (IV-D-251), Environmental Defense Fund (IV-D-174), p. 12-13, International Center for Technology Assessment (IV-D-182), League of Women Voters (IV-D-213), League of Women Voters - La Grange Area (IL) (IV-D-169), League of Women Voters of Maryland (IV-D-274), League of Women Voters of West Virginia (IV-D-275), Mathur, A.T. (IV-F-106), Mavec, Ken (Cleveland) (IV-F-134), Multiple Private Citizens (IV-D-1, 2, 6, 7, 9, 12, 15, 16, 27, 29, 30, 33, 44, 145, 160, 172, 184, 230, 267, and 269), SC Department of Health and Environmental Control (IV-D-56), p. 3, Sierra Club - northeastern OH (Cleveland) (IV-F-134), Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), U.S. Public Interest Research Group (Atlanta) (IV-F-132), Voicemail Transcript Reports (IV-D-34 and 35)**

**RESPONSE:** Our efforts in this rulemaking have required us to balance the need for rapid air quality benefits with appropriate lead time for manufacturers. While we recognize that technology exists today to make vehicles comply with the final Tier 2 standards, we must provide appropriate leadtime to enable that technology to be fully developed and applied in a cost effective manner. Further, for HLDTs, we are subject to specific leadtime requirements of the Clean Air Act. To make matters more complex, we also have to ensure that appropriate fuels are available so that new emission technologies are not damaged by fuels. This supports the value of a phase-in. We do

not want to require owners to pay for emission controls that will be damaged by high sulfur levels. Lastly, there are practical reasons for delaying the start of the program until 2004 to align with California. For the HLDTs, which will require the greatest application of Tier 2 technology, and which represent a fairly small fraction of the fleet, we believe it makes sense for manufacturers to gain experience on a smaller scale in California, before having to meet Tier 2 standards nationwide.

For many years, standards have been implemented first for California, and then applied nationwide several years later. In this rule we proposed and are finalizing to implement Tier 2 standards for about 85% of the fleet by the same years as California. For HLDTs, where we are delaying two years behind California, we implement an interim program beginning in 2004 which will bring significant reductions from current Tier 1 vehicles. This interim program for HLDTs aligns closely with California's LEVI program for the same vehicles, yet does not permit the use of the highest bin allowed by California. Plus, our program requires that these interim vehicles meet a corporate NO<sub>x</sub> average standard of 0.20 g/mi.

It should be noted that even with a more rapid implementation, the benefits are limited by fleet turnover. Most of the benefits in the early years come from the use of low sulfur gasoline by the entire motor vehicle fleet.

**COMMENT C:** EPA should allow additional time for manufacturers to produce vehicles that meet the Tier 2 standards, and should phase in these standards with the first round starting in 2004 and more aggressive reductions starting in 2008, when near-zero sulfur levels will be in place. (Alliance proposal) **(Alliance of Automobile Manufacturers (IV-F-76), Alliance of Automobile Manufacturers (Atlanta) (IV-F-132), Alliance of Automobile Manufacturers (Cleveland) (IV-F-134), General Motors (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** We are phasing in the Tier 2 standards beginning in 2004 for LDV/LLDTs and 2008 for HLDTs as proposed. We believe that this is sufficient leadtime. We are also phasing in interim standards for HLDTs beginning in 2004. The Alliance's proposal would delay the final phase-in of Tier 2 standards until 2011. The Alliance phase-in proposal would increase vehicle emissions substantially compared to the program finalized today. Under our program, about 85% of the fleet will meet Tier 2 standards by 2007, with the remainder (the HLDTs) complying by 2009. We believe we have provided adequate leadtime, indeed many commenters believe we are providing too much time.

**COMMENT D:** In accordance with CAA section 202(a)(2)(C), EPA must allow a full four-year lead time for the standards applicable to heavier trucks. Thus, EPA may not require that heavier trucks comply with the Tier 2 standards prior to MY2005. **(General Motors Corporation (IV-D-209), vol. 1, p. 43-44)**

**RESPONSE:** General Motors' point is based on the requirement in section 202(a)(3)(C) of the Clean Air Act that, for vehicles over 6000 pounds GVW, EPA may not promulgate new or revised emission standards that begin earlier than the model year commencing four years after such revised standard is promulgated. Since manufacturers may, and likely will, begin the 2004 model year during the 2003 calendar year, and our rule is being promulgated at the end of 1999, an issue arises. The four years of lead time runs from the date of signature and applies to any engine family whose model year commences

earlier than four years after the date of signature. Thus, we are not promulgating mandatory standards for HLDTs of the 2004 model year when that model year commences less than four years from the signature date of this rulemaking. We recognize that there are likely to be HLDT test groups that will not need to meet the standards promulgated today for model year 2004. However, any 2004 model year test group that uses a calendar year approach for its model year, or whose model year for 2004 commences on or after the fourth anniversary of the signature date of this rulemaking, will be subject to the 2004 requirements. See 40 CFR Part 85 Subpart X and Clean Air act section 202(b)(3).

In the final rule, we are adding provisions to provide incentives to manufacturers to voluntarily make all of their 2004 model year HLDTs comply with our proposed requirements. Manufacturers who bring all of their HLDTs into the interim program in 2004 and comply with the proposed 25% phase-in requirement to the 0.20 corporate average NO<sub>x</sub> standard will have the option to use higher NMOG values for bins 9 and 10 during the interim program. Manufacturers who do not comply with the interim requirements for all of their 2004 model year HLDTs, will not. We believe that this provision will provide substantial incentive to manufacturers to comply with interim requirements in 2004, will not result in a significant increase in NMOG emissions from our NPRM provisions and will enable our program to maximize NO<sub>x</sub> benefits in the early years. For more details of this provision, see the discussion in the preamble.

**COMMENT E:** Generally states that adequate lead time should be provided to allow for the development and introduction of new technologies. **(Ohio Coalition for Vehicle Choice (Cleveland) (IV-F-134))**

**RESPONSE:** We believe our final rule provides appropriate lead time for the development and introduction of new technologies. Indeed, our final rule allows manufacturers the flexibility to select which vehicles they phase-in and provides until 2009 for manufacturers to phase-in the vehicles which will likely require the greatest application of technology. Also, our final rule harmonizes with California as much as possible to maximize the ability of manufacturers to sell the same configuration nationwide.

**COMMENT F:** EPA should allow additional time for manufacturers to develop high-efficiency diesel after treatment systems and to launch a new generation of clean diesel engines. **(Detroit Diesel Corporation (IV-D-52), p. 3-4, Detroit Diesel Corporation (Atlanta) (IV-F-132), Detroit Diesel Corporation (IV-F-92), Detroit Diesel Corporation (IV-F-96))**

**RESPONSE:** Diesels have a very small share of the light duty market (currently around 0.5%). Given our phase-in structure and even allowing for significant growth, diesels will not need to meet our Tier 2 standards for LDV/LLDTs until 2007, our interim standards for HLDTs until 2007 or our Tier 2 standards for HLDTs until 2009. If advanced technologies are needed to meet any of those standards, considerable leadtime clearly exists.

**COMMENT G:** [Reserved] [See Issue 27.4.M.2]

**COMMENT H:** EPA should strengthen the incentives for early compliance with the Tier 2

requirements. For example, the Agency could provide an incentive for manufacturers who can demonstrate that, before 2004, they have implemented enhanced marketing efforts and, as a result, have increased their sales of vehicle models that meet or exceed Tier 2 standards. **(Chicago Dept. of the Environment (IV-D-200))**

**RESPONSE:** We are finalizing as proposed our provisions that manufacturers may use alternative phase-in schedules for all phase-in requirements. These are structured in such a way that a manufacturer choosing to implement greater percentages than required or to begin the phase-in sooner than required can receive a benefit in the form of a reduced phase-in percentage requirement in a future year of the same phase-in schedule.

We are also finalizing as proposed our provision for generating early Tier 2 credits. This provision will allow manufacturers who certify Tier 2 vehicles early to obtain credits useable later for a group of vehicles having a NO<sub>x</sub> average below 0.07 g/mi.

Of the two provisions, we expect that the alternative phase-in schedules will be most used by manufacturers. We recognize that our provision for early banking will likely see only limited use. We were cautious in proposing schemes for the early generation of credits because we were concerned that such credits could be used to effectively delay the impact of the Tier 2 standards.

Ideally, a credit program provides industry the incentive to implement new technology early and rewards them by providing significant credits. This is the case when manufacturers meet Tier 2 standards before they are required, but is less the case when credits are generated from incremental reductions. While it could be argued that the environment sees all reductions equally, we do not want to see a delay in Tier 2 technology and standards due to only incremental changes in the years preceding 2004. Thus, we think our alternate phase-in schedule provides the appropriate balance.

We also want to note that, to encourage manufacturers to produce extremely low emitting vehicles, we are including provisions in the final rule to provide extra credit to manufacturers who introduce vehicles certified to the lowest two bins in the early years of the program. See preamble for details.

**COMMENT I:** No data is presented to support the Alliance's claim that a two-step phase-in of standards will improve air quality and allow automobile manufacturers to aggressively implement new technologies. Essentially, the Alliance is proposing higher emission vehicles offset by lower sulfur levels. Such a proposal would not be cost-effective. **(American Petroleum Institute (IV-D-114), p. 149, Marathon Ashland Petroleum LLC (IV-D-81), p. 68)**

**RESPONSE:** We are not adopting the Alliance's proposed phase-in, nor are we adopting the Alliance's proposed requirement for near zero sulfur fuel. We believe that the sulfur requirements we are requiring for gasoline in this rulemaking and those that we expect to implement for diesel fuel in the near future will cost effectively enable technologies that can readily comply with our Tier 2 standards in the timeframe we proposed, i.e., by 2007 for all LDV/LLDTs and by 2009 for all HLDTs.

## **ISSUE 6: PHASE-IN OF VEHICLE PROGRAM**

### **Issue 6.1: Treatment of HLDTs**

**COMMENTS A.1 - .3:** Manufacturers of large SUVs, vans, and trucks (6,000 to 8,500 lbs GVWR) should not have until 2009 to meet the Tier 2 standards. They should be required to comply by 2007 or sooner. One commenter stated specifically that EPA should require that SUVs comply with the Tier 2 standards by 2005. Another commenter added that manufacturers of HLDTs should be required to meet the interim standard of 0.2 g/mi NO<sub>x</sub> by 2005, or EPA should harmonize the interim and Tier 2 standards for all vehicles at the proposed LDV levels beginning in 2004. Commenter provides analysis to show how many HLDT engine families already meet the interim standard. In certain cases, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was approximately 3,000. (20/20 Vision (IV-F-38), 20/20 Vision (Denver) (IV-F-133), American Lung Association (IV-D-167), p. 5, American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Atlanta) (IV-F-132), American Lung Association of Gulfcoast Florida (IV-D-108), American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of Michigan (IV-F-94), American Lung Association of NY (Philadelphia - Day 1) (IV-F-131), American Lung Association of New Jersey (IV-D-211), American Lung Association of Northern Ohio (IV-F-110), American Lung Association of Ohio (IV-F-65), American Lung Association of Queens, Inc. (IV-F-40), American Lung Association of Santa Clara-San Benito (IV-D-106), American Lung Association of South Dakota (IV-D-94), American Lung Association of Virginia (IV-D-153), American Lung Association, et. al. (IV-D-98), American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Appalachian Mountain Club (IV-D-251), Appalachian Voices (Atlanta) (IV-F-132), Campaign on Auto Pollution (IV-F-44), Chicago Dept. of the Environment (IV-D-200), City of Boulder (IV-F-85), Clean Air Conservancy (IV-F-75), Clean Air Council (IV-F-28), Clean Air Network, et. al. (IV-F-95), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Cohen, David L. (IV-F-23), Colorado Environmental Coalition (IV-F-87), Colorado Public Interest Group (Denver) (IV-F-133), Department of Environmental Health, City and County of Denver (IV-F-62), EcoCity Cleveland (IV-F-84), Englebrecht, Erin (Atlanta) (IV-F-132), Environmental Defense Fund (IV-D-174), p. 12-13, Environmental Defense Fund (IV-F-128), Environmental Health Watch (IV-F-81), Fletcher, Robert E. (Atlanta) (IV-F-132), Frank, Mike (Cleveland) (IV-F-134), Frumpkin, Howard (Atlanta) (IV-F-132), GA House of Representatives (Atlanta) (IV-F-132), Galik, D.S. (IV-F-79), Goldin, L.J. (IV-D-39), Group Against Smog and Pollution (IV-F-45), Gutierrez, R. (IV-D-55), International Center for Technology Assessment (IV-D-122), p. 2-4, International Center for Technology Assessment (IV-D-182), Kauffman, W. (IV-D-212), Kostmeyer, Peter (IV-F-27), Lancaster Greens (IV-F-29), Lancaster Greens (Philadelphia - Day 2) (IV-F-131), Langon, John (Philadelphia - Day 2) (IV-F-131), League of Women Voters (IV-D-213), League of Women Voters (Philadelphia - Day 2) (IV-F-131), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), MI Environmental Council (Cleveland) (IV-F-134), Maine Dept. of Environmental Protection (IV-D-177), Manatee County Government (IV-D-45), Maslin, Mindy (Philadelphia - Day 2) (IV-F-131), Mason, P. (IV-F-70), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 4, Michigan Environment Council (IV-F-105), Miller, J.C. (IV-F-71), Multiple Private Citizens (IV-D-2, 6, 7, 9, 12, 15, 16, 22, 27, 29-31, 33, 144, 145, 160, 161, 172, 184, 230, 233, 234, 247, 248, 263, and 267-269), NE Ohio Empact Project (IV-F-80), NJ Public Interest

Research Group (Philadelphia - Day 1) (IV-F-131), New Hampshire Dept. of Environmental Services (IV-D-163), NESCAUM (IV-D-130), p. 6, Ohio Environmental Council (Cleveland) (IV-F-134), Ohio Lung Association (Cleveland) (IV-F-134), Ohio Public Interest Research Group (IV-F-98), Ozone Transport Commission (IV-D-112), p. 2, PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 2-3, Pete Maysmith (Denver) (IV-F-133), Phan, Kimmy (Atlanta) (IV-F-132), Physicians for Social Responsibility (IV-D-194), Ray, C. (IV-F-101), Rollins, Rebecca (Cleveland) (IV-F-134), SC Coastal Conservation League (IV-D-260), SC Department of Health and Environmental Control (IV-D-56), p. 2, STAPPA/ALAPCO (IV-D-67), p. 6; att. 2, p. 3, STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Sierra Club (IV-F-14), Sierra Club (IV-F-3), Sierra Club - Northeastern OH (Cleveland) (IV-F-134), Sierra Club, Maryland Chapter (IV-F-53), Sierra Club, Northeast Ohio Group (IV-F-103), Sierra Club, PA Chapter (IV-D-215), Sierra Club, Pennsylvania Chapter (IV-F-37), Sierra Club, Southwest Region (Denver) (IV-F-133), Sierra Club, Utah Chapter (IV-F-116), Smith, Tom (Cleveland) (IV-F-134), State PIRG Petitions (IV-D-241 and 249), Sunday, D. (IV-F-108), Tennessee Environmental Council (IV-F-872), Tomaka, Tom (Denver) (IV-F-133), Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), Trepal, C. (IV-F-109), U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (IV-F-55), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Cleveland) (IV-F-134), Union of Concerned Scientists (IV-F-88), Union of Concerned Scientists (IV-D-195), p. 5-7, Voicemail Transcript Reports (IV-D-34, 35, and 235), Waring, George (Atlanta) (IV-F-132), White, Randall F. (IV-F-10), Winant, Howard (IV-F-18), Wyncote Audubon Society (IV-F-8))

**RESPONSE:** We received a large number of public comments at our four public hearings and by submittal to the docket indicating that we should not provide additional time for manufacturers to make HLDTs comply with our Tier 2 standards. We received opposing comments from industry. We are finalizing our proposal to permit HLDTs until 2009 to comply with the final Tier 2 requirements. We note that these vehicles must be 100% phased-into California's program by 2007. We believe that these vehicles, which represent about 15% of the light duty fleet will require the greatest application of technology and therefore require the greatest leadtime. We believe it is appropriate for manufacturers to gain experience with these vehicles on a smaller scale in the California market before having to launch them nationwide.

As we state in the preamble, the HLDTs will be coming into the Tier 2 program from relatively high Tier 1 levels where full life NO<sub>x</sub> standards of 0.98 g/mi and 1.53 g/mi prevail for LDT3s and 4s, respectively. These levels are considerably higher than the Cal LEV I standards that will apply in California prior to 2004. Our interim program will provide significant reductions from the LDT3s and LDT4s and we believe the four year phase-in to that program is appropriate to aid manufacturers in cost-effectively matching changes in emission control systems with other planned vehicle changes.

As we indicate elsewhere in this document, we believe that many commenters overlook the significance of our interim program for these vehicles. This program will bring 100% of HLDTs down from Tier 1 levels in 2005 and may bring many or all down in 2004. It will phase them into an average NO<sub>x</sub> level of 0.20 g/mi by 2007. Then in 2008, 50% will

meet 0.07 g/mi NO<sub>x</sub> on average. (See the preamble and also our responses in Issue 5 for a discussion of the leadtime issue associated with the 2004 model year and our incentives to induce manufacturers to voluntarily comply for all 2004 model year HLDTs.)

**COMMENTS B.1 - .3:** Manufacturers of HLDTs should be allowed additional time beyond 2009 to comply with the proposed standards. One commenter stated that additional lead time is essential to enable manufacturers to develop the technology that will be necessary for HLDTs to meet the Tier 2 standards. Another commenter stated that EPA should adjust its Tier 2 schedule to require phase-in over a four year period, with Tier 2 levels applying to 100 percent of the HLDTs in 2011. Manufacturers should be allowed an extra two years to comply with the standards. Finally, one commenter specifically supports the Alliance proposal on this issue. **(American Honda Motor Co. (IV-F-48), Engine Manufacturers Association (IV-D-71), p. 18-19, Georgia Coalition for Vehicle Choice (IV-F-34), Navistar International Transportation Corp. (IV-D-50), p. 4,23, Ohio Coalition for Vehicle Choice (Cleveland) (IV-F-134), Pennsylvania Coalition for Vehicle Choice (IV-F-46), Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 22)**

**RESPONSE:** The summary of comments in 6.1.A, above, reflects that we received a very large number of comments against providing additional time beyond 2009 to comply with the Tier 2 standards. Our response under that issue explains why we are not providing additional time for complying with the final Tier 2 standards for any category of vehicle.

Essentially, we believe we are providing adequate leadtime. We believe that vehicle and engine technology and appropriate low sulfur fuels will be available to enable all categories of vehicles to meet the standards we are finalizing by the corresponding dates.

Our own experience with the Chevrolet Silverado and the Ford Expedition clearly indicate that the standards are feasible in the timeframe we are requiring.

**COMMENT C:** EPA should ensure that manufacturers do not allow their 6,000 lb vehicles to creep up into the heavier weight group to take advantage of the two year extension. **(Ozone Transport Commission (IV-D-112), p. 2, Sierra Club (IV-F-3))**

**RESPONSE:** We have considered the possibility that manufacturers could increase the GVW of certain trucks as a way of gaining additional time under our phase-in schedule. In this scenario a manufacturer would add GVW to an LDT2 and raise it above 6000 pounds GVW, making the truck into an LDT3. While we believe it is possible a manufacturer may do this, our understanding of the relatively high costs of adding GVW versus the low costs to comply with our Tier 2 requirements suggest that this would not be an economically desirable move for the manufacturer for these trucks. Further, the manufacturer might end up with a "hole" in its product line in the sector just under 6000 pounds GVW. Lastly, after the phase-ins were complete for all vehicles, the manufacturer would likely have to reengineer the vehicle back down to the original GVW and incur further costs to do so.

**COMMENTS D and E:** EPA has not indicated how it will address the possibility that automakers might add weight to HLDTs to avoid Tier 2 requirements. As a result, its



request for comment on this issue is not sufficiently concrete. Manufacturers need not be restricted from modifying products that might then be reclassified from HLDT to HDT because increasing vehicle weight to exceed the maximum (i.e., 8,500 lbs) would be undesirable for manufacturers from a technical and marketing standpoint. The heaviest LDT has a GVWR of about 7,700 lbs. and the lightest HDT has a GVWR of about 8,600 lbs. Any effort to "bump-up" LDTs to 8,500 lbs would create a product void in the 7,500-7,700 lbs range. Manufacturers will refrain from arbitrarily increasing size because of the added cost of doing so. Arbitrary increases to curb weight or frontal area would directly decrease the available payload, performance, and fuel economy of a vehicle, which would be undesirable from a marketing standpoint. **(Alliance of Automobile Manufacturers (IV-D-115), p. 77-78, Engine Manufacturers Association (IV-D-71), p. 24, General Motors Corporation (IV-D-209), vol. 1, p. 63)**

**RESPONSE:** In the NPRM, EPA raised concerns about the potential for manufacturers to avoid the Tier 2 program for their heaviest light-duty trucks (LDT4s) by redesigning them so that they would meet the definition of heavy-duty vehicle rather than the definition of light-duty truck.<sup>1</sup> EPA requested comment on this issue along with several possible measures to prevent this migration of light-duty trucks to the heavy-duty category. Comments D and E address this specific request for comments.

We also received related comments (not in direct response to this issue) on the appropriateness of applying Tier 2 standards to some heavy-duty vehicles. Numerous commenters were concerned about emissions from heavy-duty vehicles and recommended including at least a portion of these vehicles in the Tier 2 program. Our summary and response to these comments are provided in Issue 1.3 (program coverage) and Issue 39.

We remain very concerned about emissions from heavy-duty vehicles, or vehicles above 8,500 pounds GVWR, and are taking steps to substantially reduce their emissions. As described in the preamble and in our response to Issue 1.3 and Issue 39, we are including passenger vehicles (primarily SUVs and passenger vans) above 8,500 but not more than 10,000 pounds GVWR in the Tier 2 program. For the remaining heavy-duty vehicles, we are progressing with plans to adopt more stringent standards, as discussed in our response to Issue 35. Our preamble text and our responses under Issue 39 address the specific requirements we are finalizing for passenger vehicles from 8501 to 10,000 pound GVWR.

Regarding the commenter's claim that EPA's discussion of this issue, and how EPA will address it, in the initial NPRM was not sufficiently concrete, EPA believes that we gave specific attention to this particular issue, provided several ways to address it, and asked specifically for comment on the issue, which does provide sufficiently concrete information on which to comment. However, even if the comment had merit at the initial proposal stage, this is certainly no longer the case, because subsequent to the initial proposal, EPA proposed specific regulations which would include specific types of vehicles over 8500 pounds GVWR in the Tier 2 program and provided time for comment on these regulations. See 64 FR 58472, 58502-07 (Oct. 29, 1999).

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<sup>1</sup> Heavy-duty vehicle is defined as a vehicle rated at more than 8,500 pounds GVWR or that has a curb weight of more than 6,000 pounds and that has a basic vehicle frontal area in excess of 45 square feet. GVWR is almost always the determining factor for complete heavy-duty vehicles.

With regard to the migration issue specifically, we understand the points made by the Alliance. Manufacturers are not likely to abandon the LDT4 market which has been a very successful product market segment for them. However, without the regulations promulgated today, vehicles near the 8,500 pound GVWR cut point could take advantage of this cut point and make small changes to allow the vehicle to meet the heavy-duty definition. It is not therefore surprising that, under the regulations applicable to current vehicles and engines, the largest LDT4s are about 800 pounds below the cut point, while the lightest HDTs are only about 100 pounds above the cut point. The other types of redesigns needed to make a vehicle meet the heavy-duty definition would likely have performance and cost implications that would outweigh potential gains from avoiding Tier 2 standards. We believe that the reduced emissions standards noted above for vehicles above 8,500 pounds GVWR also substantially decrease any incentive manufacturers might have to redesign vehicles for purposes of gaming the truck definitions. Therefore, we are not finalizing additional provisions to address these concerns.

**COMMENT F:** HLDTs should not be included in the same averaging set as passenger cars and LLDTs for determining compliance with the fleet-average NO<sub>x</sub> standard starting in 2009 (or at any time thereafter). (**Alliance of Automobile Manufacturers (IV-D-115)**, p. 74-75)

**RESPONSE:** We do not agree that ultimately placing all LDVs and LDTs into the same averaging set disadvantages any particular manufacturer. Rather we think that it provides "full line" manufacturers with the flexibility to generate credits on its LDVs and LLDTs for use with its HLDTs. If the full line manufacturer wants to segregate its HLDTs from its LDVs and LLDTs for credit generation and usage purposes, it is free to do so. However, we think the system we have proposed is far more flexible for the full line manufacturer than a split system in which the same NO<sub>x</sub> average standard would apply to both groups, but the manufacturer would be prohibited from exchanging credits between the groups. For additional discussion on this subject, see our response to Issue 2.1.2.B.1.

**COMMENT G:** EPA should investigate alternate means to eliminate continued growth of emissions due to market share migration to vehicles (6,000+GVWR) falling outside the more stringently controlled classes. EPA should also limit the growth of emissions due to increases attributed to growth in market share of the higher emitting Tier 2 LDT and SUVs between now and the implementation of Tier 2. Consideration of this approach is required by section 202 which specifies that EPA must consider alternate means to attain or maintain the NAAQS. (**National Petrochemical and Refiners Association (IV-D-118)**, p. 14-15)

**RESPONSE:** See our response under this Issue 6.1.C. This commenter indicated that our proposal did not adequately address continued growth of higher emission vehicles. We presume that commenter means the increase in the sales of light duty trucks and sport utility vehicles. One of our primary goals in this rulemaking that was explained in the preamble to the NPRM is to address the issue of increasing sales of vehicles subject to light duty truck standards. Consumer choices of these vehicles has meant that fewer vehicles (LDVs) are being built that are subject to the most stringent standards. We address this problem directly in our Tier 2 program by ultimately imposing the same exhaust emission standards on all LDVs and LDTs.

We believe that any promulgation of our final rule will discourage movement of vehicles from under 6000 lbs GVW to over 6000 lbs GVW. As we said in our response under 6.C above, we do not believe manufacturers will create holes in their product lines below 6000 pounds to avoid the LDT2 emission standards knowing that in a few more years they would need to reengineer the vehicles to the interim HLDT standards and then to the final Tier 2 standards.

**COMMENT H:** Supports the 2009 compliance deadline for HLDTs because the extended period will enable the cleaner HLDTs to be produced in a reasonable timeframe that takes into account the work-use nature of these vehicles' designs. **(State of Wisconsin (IV-D-166))**

**RESPONSE:** We are finalizing our phase-in dates for Tier 2 vehicles including HLDTs as proposed. We agree with this comment.

## **Issue 6.2: Other Phase-in Issues**

**COMMENT A:** EPA should retain the 100K mile useful life requirement for the non-Tier 2 fleet during the phase-in of the Tier 2 standards. **(Alliance of Automobile Manufacturers (IV-D-115), p. 81)**

**RESPONSE:** Based on extensive comment from manufacturers, both in their comments and in meetings with EPA, we are adopting this comment in our final program. In our proposal, we would have required all LDVs and LLDTs to meet 10 year/120,000 mile useful lives beginning in 2004. Manufacturers pointed out that this requirement (coupled with others) would have virtually ruled out any carry-over of emission certification from the 2003 model year. This was not our intention. In the final rule we are requiring that manufacturers meet 10 year/120,000 mile useful lives for their LDV/LLDTs as those vehicles are phased-into the Tier 2 standards.

**COMMENT B:** EPA's proposed alternative schedule is too restrictive. Constraining alternative phase-in schedules to the second and third years of the program offers manufacturers little benefit because it is the first and last years of the program when they face the biggest challenges and need the most flexibility. EPA should adopt the phase-in schedule for Tier 2 vehicles proposed by the Alliance. EPA also should allow manufacturers to extend full compliance beyond the last year of the nominal phase-in. These changes would have the benefit of harmonizing the schedules with LEV II California vehicles, thereby reducing the number of required engineering programs during the Tier 2 phase-in. **(Alliance of Automobile Manufacturers (IV-D-115), p. 44-47)**

**RESPONSE:** We are finalizing our alternative phase-in schedule provisions as proposed. We believe that these provisions add flexibility for manufacturers wishing to introduce some Tier 2 vehicles early. We disagree with the comment that these provisions only offer benefit in the second and third year of a four year phase-in. In fact, these schedules permit manufacturers to phase-in less than 25% in the first year provided it has introduced vehicles prior to the first year and its summed percentages through the end of the first year equals at least 25% (or optionally 20%, see preamble text). We did not propose and are not finalizing to permit alternative phase-in schedules to extend beyond the final phase-in year of the primary schedule. We believe that adequate technologies will be available for all vehicles to meet our interim and final Tier 2 standards by the indicated final phase-in year. While we want to provide phase-in flexibility, we know of no need, and the comments have not provided an acceptable reason, to permit delays beyond the specified 100% phase-in years specified in the NPRM. Further, as mentioned numerous times throughout this document, there is substantial public sentiment against providing any delays in the phase-in of the Tier 2 standards.

**COMMENT C:** [Reserved]

**COMMENT D:** The proposed Tier 2 is flexible enough for manufacturers without allowing alternative phase-in schedules, which would greatly confound monitoring and enforcement efforts. **(Union of Concerned Scientists (IV-D-195), p. 13)**

**RESPONSE:** We have considerable experience with many different implementation

schemes and programs covering a wide range of mobile source sectors. We design these programs with an eye toward compliance monitoring and enforceability. Our proposal and final rule indicate that we will condition the certificates of conformity upon a manufacturer's adherence to the phase-in requirements, including the alternative phase-in requirements. If a manufacturer violates these requirements, its certificate can be voided ab initio. If a certificate is voided, the manufacturer has, in effect, sold uncertified vehicles. The Clean Air Act provides for substantial civil penalties in such cases. We believe that the option to employ alternative phase-in schedules provides an important degree of flexibility for manufacturers who can not accurately predict sales or whose test groups may be sized inappropriately to readily match the primary phase-in schedule. We believe we will have appropriate monitoring opportunities and significant control over the manufacturers' phase-ins. We are finalizing provisions for alternative phase-in schedules as proposed.

**COMMENT E:** Generally supports the phase-in proposal. **(Wisconsin Transportation Builders Association (IV-D-185))**

**RESPONSE:** We are finalizing the phase-in schedules largely as proposed.

## ISSUE 7: ABT PROGRAM - VEHICLES

**COMMENT A:** The Tier 2 credit averaging and banking systems are invalid because they are too susceptible to fluctuations in market and economic forces. EPA notes that the averaging and banking system provides added flexibility and allows standards that otherwise would be infeasible to become feasible. However, feasibility cannot lawfully be predicated on factors outside the manufacturers control. EPA has relied on the potential cost savings from an averaging and banking scheme that includes both cars and trucks to justify this extremely stringent standard. However, the Tier 2 standards are so stringent and the potential penalties of at least \$25K per car so severe that manufacturers cannot afford to take advantage of the savings that may flow from a predictable regime of averaging and banking. EPA should use much smaller non-conformance penalties (NCP) as an option. Under EPA's proposal, unpredictable changes in economic conditions (i.e., recession, growth, fuel prices) could mean that too few credits would be banked prior to 2004 MY to make up for the shortfalls caused by the infeasibility of the standards in 2004 MY and later. In addition, the practice of revoking certificates based on noncompliance with a credit banking requirement, is inconsistent with the plain terms of section 206. The benefits of the proposed ABT system are questionable; therefore, the system should not be used as a basis for finding technological feasibility. GM provides a detailed example to illustrate how EPA's averaging system does not provide enough flexibility to manufacturers and cites to *City of Oswego v. FERC*, 97 F.3d 1490, 1498 (D.C. Cir. 1996) and *Chrysler Corp. v. EPA*, 631 F.2d 865, 888 (D.C. Cir.) as supporting documentation for the assertion that feasibility cannot be based on factors outside manufacturers' control. **(General Motors Corporation (IV-D-209), vol. 1, p. 53-57)**

**RESPONSE:** The Tier 2 standards are feasible for cars and they are feasible for trucks. Manufacturers will not need to use the averaging provisions of this rule to meet the standards promulgated for either LDVs, LLDTs or HLDTs. Our proposal to permit cars and trucks to be averaged together provides increased flexibility to manufacturers who produce both.

The commenter provides an elaborate argument, replete with a hypothetical marginal cost example, to imply that the savings a manufacturer might accrue through our averaging program are dwarfed by the civil penalties a manufacturer would incur if it were unable to meet the applicable corporate average NO<sub>x</sub> standard. The example is presented in such a way as to assert that the specific savings associated with averaging cars and trucks together are small, but the potential civil penalties are huge so therefore we should implement a program of non-conformance penalties which would be predictable and smaller than the available civil penalties under the Act.

There are a number of things wrong with the commenter's approach and conclusions. First, the issue of civil penalties applies whether the manufacturer averages vehicles and trucks together or not. If we provided for separate averaging sets, as some (including this commenter) have suggested we do, the same penalty provisions would apply to each set, but the manufacturer would have less flexibility in complying with both.

Second, the commenter completely ignores the proposed provision that would allow it to carry a credit deficit forward into the next model year. This would provide an opportunity for the manufacturer to adjust sales and/or emission calibrations to generate offsetting credits and cover the exceedance of the average NO<sub>x</sub> standard from the previous year. We note elsewhere in this document, as well as in the preamble to the final rule that we

are expanding that provision, in response to comments from industry, to permit credit deficits to be carried forward for a maximum of three model years. This should greatly allay manufacturer's concerns about facing civil penalties -- of any size.

Third, the commenter's entire analysis is based upon assumptions that the maximum available civil penalty would be applied in any case where the manufacturer failed to meet its corporate average NO<sub>x</sub> standard. The commenter's example relates to a situation where a manufacturer is unable to attain the corporate average NO<sub>x</sub> standard because "...of error in the forecast of ... the relative demand for cars and trucks". (See comment IV-D-209, page 56). While the maximum civil penalty is a possibility under the Act, the motor vehicle industry and this commenter are well aware of EPA's use of civil penalties from a wide range of values below the maximum available amount. Further, this commenter has voluntarily agreed to meet the requirements of the NLEV program which are essentially identical to these.

Fourth, the commenter asserts that the averaging and banking provisions of the NPRM will not even be used because of the "...potential penalties of at least \$25,000 per vehicle for selling vehicles without certificates". Our experience, and indeed the commenter's own experience, suggest otherwise. The same civil penalties apply to manufacturers who fail to comply with our heavy-duty engine corporate averaging standards. Virtually all heavy duty engine manufacturers, including this commenter, have participated in this averaging program for nearly a decade. HDE manufacturers have chosen overwhelmingly to participate in averaging and banking for these engines to the point where NCP provisions, which are available for these engines, lie virtually unused. NCP provisions were widely used by HDE manufacturers before the averaging and banking program was introduced. NCP provisions are not available for light-duty vehicles and trucks. See CAA § 206(g). Lastly, NCPs create a situation where a manufacturer pays significant (and annually escalating) sums of money to the government for the right to emit above a prescribed standard. While that is certainly an incentive for the manufacturer to meet the standards, it also diverts capital from research and development. A better system from the perspective of the environment is one where all vehicles meet a given standard on average.

The commenter states, with no supporting discussion, that our proposal to void certificates in cases where manufacturers fail to attain compliance with the average NO<sub>x</sub> standard is inconsistent with the plain terms of section 206 of the Clean Air Act.

Section 202 of the Act authorizes and requires the Administrator to set emission standards

...applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines...

Section 206(a)(1) of the Act requires the Administrator to issue certificates of conformity with such standards

...upon such terms, and for such period... as he may prescribe.

Section 206 does not prevent the conditioning of certificates upon other factors. One alternative to voiding certificates ab initio would be the suspension and revocation of certificates. However, in the context of compliance with corporate average emission standards, suspension or revocation under section 206 would not be a practical

enforcement route. Simply put, by the time a manufacturer submits its report of compliance or noncompliance with the corporate average standard, all certificates of conformity for that model year are likely expired. EPA therefore would enforce the corporate average NO<sub>x</sub> standard by determining relevant certificates to be void ab initio for failure to comply with the terms and conditions of the certificate. Vehicles produced under such certificate would then be considered uncertified and would be in violation of the provisions of section 203(a)(1) of the Act.

Given this commenter's long-held position in support of averaging programs and its advocacy for them in the revision of the Clean Air Act, EPA is perplexed by this lately discovered concern. If there is a concern truly held, they need not comply using averaging. We believe the standards are feasible for all vehicle classes.

**COMMENT B:** Credits earned under the ABT program should expire after a specified amount of time and should be discounted in the years leading up to the expiration date. Two commenters support the California ABT schedule by which credits are discounted to 50, 25, and 0 percent of their original number at the end of the second, third and fourth year, respectively, following the year in which they were generated. **(California Air Resources Board (IV-D-271), p. 2-3, Maine Dept. of Environmental Protection (IV-D-177), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 5, NESCAUM (IV-D-130), p. 6, Ozone Transport Commission (IV-D-112), p. 3, SC Department of Health and Environmental Control (IV-D-56), p. 3, Union of Concerned Scientists (IV-D-195), p. 12, STAPPA/ALAPCO (IV-D-67), p. 7)**

**RESPONSE:** We did not propose and are not finalizing a discounting/life limiting scheme similar to that employed by California in the Cal LEV program. As indicated in the NPRM, we believe that such an approach may be appropriate where the corporate average standard is declining. Our concern with credit generation and usage where declining standards are involved has long been that credits are earned *relatively* easily under the higher standard and then can be used to effectively delay the implementation of the later standard. This is why, in our NPRM and final Tier 2 rule, we are not permitting manufacturers to use credits earned under the interim program against the final Tier 2 corporate average NO<sub>x</sub> standard. It is also one reason why in our Marine spark ignition engine rule where we have an annually declining standard (40 CFR Part 91), we impose finite limits on credit life (three years).

In the Tier 2 program, once the two interim programs end, a fixed NO<sub>x</sub> average standard will apply across all vehicles. This is a stringent standard, and we believe that when a manufacturer surpasses this standard, real environmental benefit occurs. We do not wish to discourage manufacturers from creating such environmental benefits by lessening their value to the manufacturer through discounting. Also, we do not wish to encourage manufacturers to use such credits by setting a deadline for their use through a lifespan limit.

**COMMENT C:** Manufacturers should not be allowed a year to make up for a credit shortfall; they should be required to meet their targets on time. **(American Lung Association (IV-D-167), p. 5-6, American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association of Gulfcoast Florida (IV-D-108), American Lung Association of New Jersey (IV-D-211), American Lung Association of South Dakota (IV-D-94), American Lung**



**Association of Metropolitan Chicago, et. al. (IV-D-226), Appalachian Mountain Club (IV-D-251), Chicago Dept. of the Environment (IV-D-200), p. 4, Clean Air Council (IV-F-28), Clean Air Network, et. al. (IV-F-95), Department of Environmental Health, City and County of Denver (IV-F-62), International Center for Technology Assessment (IV-D-122), p. 7, Michigan Environment Council (IV-F-105), Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 2, STAPPA/ALAPCO (IV-D-67), p. 7, STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77))**

**RESPONSE:** We understand and appreciate the position of these commenters, but we must balance their (and our) desire for a stringent program with consideration for the realities and practical problems that face the auto industry. We must promulgate a workable program if we expect to attain real emission benefits. The industry will not plan ahead to exceed the average standards. However, provisions need to be in place to address shortfalls. To that end, we proposed to allow manufacturers to cover any credit deficit that occurs one year with credits that are generated the next year. We reasoned that manufacturers would not always be able to accurately forecast sales of vehicles using the various bins and therefore situations might occur where sales of vehicles from low bins fell short of those needed to offset vehicles at higher bins.

Based upon significant and convincing comments from industry, we are extending the period available to cover credit deficits. We have been persuaded by industry comments that, by the time a manufacturer is able to ascertain its corporate average NO<sub>x</sub> emissions for one model year, sales and production plans will already be established for the next model year. Indeed, due to early marketing of model years, vehicle sales for the next model year may be well underway.

In the final rule we are permitting manufacturers to carry a credit deficit forward for two model years without penalty. However, if the manufacturer can not resolve the credit deficit after two model years, it will have to generate credits in the third model year at a quantity of 1.2 times its need to cover the old deficit, i.e. we are applying a 20% discount in the third year. The manufacturer will not be allowed to carry a deficit beyond the third year. As a safeguard to prevent manufacturers from moving deficits forward indefinitely we are adding the requirement that manufacturers must apply all of its credits to its current year needs, before it can use any credits to address a deficit from a past year.

**COMMENT D:** Manufacturers should have the flexibility to generate early credits for both interim and final Tier 2 fleet averages. **(Alliance of Automobile Manufacturers (IV-D-115), p. 96-98)**

**RESPONSE:** We did not propose and are not finalizing provisions for manufacturers to generate early credits for the interim programs.

The interim program for LDV/LLDTs is essentially a continuation and phase-out of an existing program (the NLEV program). While we will require the LDT2s in the interim program to attain a tighter NO<sub>x</sub> standard than under NLEV, we still do not believe that an early banking program is appropriate. We are concerned that, in that program, manufacturers could generate windfall credits from vehicles already in clear compliance with the NLEV standards and could use those credits to obviate the need for any emission reductions for the interim LDT2s. If manufacturers do introduce Tier 2 compliant vehicles in the 2003 or earlier model years, they can earn Tier 2 credits and/or

take advantages of an alternative phase-in schedule for the Tier 2 program.

The Alliance argues that permitting early credits for the interim standards would encourage early introduction of low NO<sub>x</sub> emission technology. Presumably this argument would apply mainly to the HLDTs since the interim program for the lighter vehicles would primarily be a continuation of NLEV, as discussed above. The issue of windfall credits is a special concern with interim HLDTs, because, depending upon how the program was set up, such credits might be generated against very high Tier 1 standards and then applied to much lower interim standards to effectively delay the implementation of those standards. We do not believe that the interim standards for HLDTs will be difficult to meet given the current certification levels of federal LDT3s and LDT4s and given that manufacturers already face very similar standards in California. In our final rule, if manufacturers do introduce Tier 2 compliant HLDTs before 2008 they can earn Tier 2 credits and/or take advantage of an alternative phase-in schedule for the Tier 2 program.

**COMMENT E:** EPA should allow manufacturers to comply with the NO<sub>x</sub> fleet average enforcement program by using three years' worth of carry-forward and carry-back credits. **(Alliance of Automobile Manufacturers (IV-D-115), p. 97-98, National Automobile Dealers Association (IV-D-129), p. 2)**

**RESPONSE:** Our program, as proposed, already provides for the "carry-forward" of credits within the interim or Tier 2 program. We did not propose and are not finalizing to permit interim credits to be carried forward from the interim into the Tier 2 program because of our concern about credits generated under one standard being applied to vehicles under a much lower standard. However, in our final rule, based upon comment, we are providing that credit deficits may be carried forward for up to three years. In this provision we will permit interim deficits to be carried forward into the Tier 2 program, where they must be repaid with Tier 2 credits.

**COMMENT F:** EPA should consider providing credits (based on modeled air-quality benefits) for reductions that would be achieved from using innovative strategies. **(Alliance of Automobile Manufacturers (IV-D-115), p. 99)**

**RESPONSE:** In our final program, we are providing that manufacturers may bank additional credits for vehicles certified to bins 1 and 2 through model year 2005. See also our response under this Issue 26.1.2.

**COMMENT G:** Questions whether interim credits are necessary. If so, EPA should consider strategies to prevent automakers from amassing windfall credits. **(Union of Concerned Scientists (IV-D-195), p. 1, 12-13, Union of Concerned Scientists (IV-F-88))**

**RESPONSE:** We believe interim credits are necessary and appropriate. We believe it is reasonable to provide manufacturers with the ability to apply technology as they see fit during the interim period, provided the average vehicle complies with the specified average NO<sub>x</sub> standard. Credit schemes enable manufacturers to more cost-effectively comply with a given standard. Also, for the interim program, we believe it is important to harmonize with California to the extent possible, and California uses an averaging program and permits credits to be banked and traded for vehicles during these years. As our previous responses in this document indicate, we did not propose and are not

finalizing to permit manufacturers to bank interim credits early or to use interim credits against the Tier 2 average NO<sub>x</sub> standard. Our main reason for this is our concern about windfall credits and the effect that such credits might have on the ultimate implementation of the Tier 2 standards.

**COMMENT H:** EPA should allow trading between the intermediate and final fleet average requirements. **(Alliance of Automobile Manufacturers (IV-D-115), p. 96-98)**

**RESPONSE:** We did not propose, and are not finalizing, to permit interim credits to be used in the final Tier 2 program. We have provided our rationale for this in response to other points under this Issue 7.

**COMMENT I:** EPA should base advance NO<sub>x</sub> fleet average credits on the difference between the required full-useful-life NO<sub>x</sub> emission level the year they are earned and the level to which the credit-generating vehicles are certified. **(Alliance of Automobile Manufacturers (IV-D-115), p. 96-98)**

**RESPONSE:** Under this comment EPA would permit advance (early) credits to be generated based upon the distance from a test group's certification level to the prevailing standard. Yet manufacturers belonging to the Alliance maintain that they need considerable "headroom", often as much as 100%, above their certification levels to allow for in-use emission deterioration and still remain under the standard. This comment would essentially turn that headroom into credits, even though the emissions of the vehicles could be expected to be well above the certification level at some point in the vehicles' lives. These credits would not represent gains to the environment. We did not propose and are not finalizing to permit such credit generation.

**COMMENT J:** Additional NO<sub>x</sub> credit should be provided in the fleet average calculation for vehicles certified to a useful life of 150K miles. One commenter suggested this additional credit only if the auto company also meets a 0.02 g/mile NO<sub>x</sub> standard and a near zero evaporative standard. **(American Lung Association (IV-D-167), p. 4-5, STAPPA/ALAPCO (IV-D-67), p. 6, Massachusetts Department of Environmental Protection (IV-D-137), p. 4-5)**

**RESPONSE:** We believe that manufacturers willing to take responsibility for the emissions of their vehicles for greater mileage and to demonstrate that emission durability in the certification program are likely creating an environmental benefit and therefore merit additional credits. We see no reason why these vehicles should have to have near zero exhaust and/or evaporative emissions to obtain such credits. We believe it is a worthy goal to encourage manufacturers to certify for longer periods of time no matter what bin of standards they certify to.

**COMMENT K:** For purposes of determining generated NO<sub>x</sub> credits or needed credits, EPA should revise its requirement to round off the fleet average NO<sub>x</sub> values to one place beyond the applicable standard before comparing them with the applicable fleet average NO<sub>x</sub> standard. EPA should require rounding of the NO<sub>x</sub> fleet average to seven places after the decimal. **(Alliance of Automobile Manufacturers (IV-D-115), p. 100)**

**RESPONSE:** We are adopting a rounding procedure that will allow manufacturers to round their calculated fleet average NOX emissions to as many significant figures as are contained in the denominator of the equation used to calculate fleet average emission results. The issue here is that rounding to the same number of significant figures as the standard or to one additional figure, can have an effect on the resultant credits the manufacturer calculates, particularly for a large manufacturer.

Another way to determine credit needs and credit generation would be to compute credits for each bin. Then there would be no rounding issue with the NOX standard. However for administrative simplicity, we have chosen to require the manufacturers to first compute their fleet average NOX emissions, which entails rounding. Thus it is appropriate to permit the manufacturers to round to a number of decimal places proportional to the size of their overall sales.

**COMMENT L:** With respect to the additional NO<sub>x</sub> credits that manufacturers could gain for vehicles certified to a useful life of 150K miles, EPA should revise the proposed multiplier from 85 to 75 percent (which is consistent with the 25 percent increase in useful life) to improve the incentive for manufacturers. **(Alliance of Automobile Manufacturers (IV-D-115), p. 83)**

**RESPONSE:** We proposed the multiplier at 85% to be equivalent to the approach used by California, recognizing that manufacturers have asked for as much harmony between the mechanics of the two programs as possible. We recognize that vehicles certified to meet standards for 150,000 miles take on a useful life that is 25% longer than otherwise required. We also note that the in-use testing requirement under the CAP 2000 program for such vehicles will end at 105,000 miles. Also, the difficulty for EPA to conduct in-use testing at such high mileages increases, because it becomes harder to find test vehicles for which the owner can document proper maintenance and use. Giving manufacturers a full 25% credit for certifying at 150,000 miles essentially presumes that vehicles would otherwise begin to emit well above their previous levels at mile 120,001. While we expect general deterioration during this part of a vehicle's life, we do not generally expect such severe deterioration, especially at the beginning of this period. Until we have some experience with the usage of this provision and the in-use durability of Tier 2 vehicles, we believe it is appropriate to take a conservative approach. We are finalizing this provision as proposed.

**COMMENT M:** EPA should allow the generation and banking of NO<sub>x</sub> emission credits from HLDTs prior to 2004 for use in meeting the interim and full Tier 2 standards. **(Engine Manufacturers Association (IV-D-71), p. 20-21, Navistar International Transportation Corp. (IV-D-50), p. 22)**

**RESPONSE:** We have addressed the reasons why we are not permitting interim credits for HLDTs to be generated before 2004 in previous responses under this Issue 7. In our final rule we are permitting early Tier 2 HLDT credits to be generated as early as the 2001 model year. This is a change from the NPRM we are making to reconcile the generation of early Tier 2 credits with our proposed alternative phase-in provisions.

**COMMENT N:** Supports the ABT program for automobile manufacturers. **(Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 3, Coalition of Small**

**Volume Automobile Manufacturers, Inc. (IV-D-136), Nissan North America, Inc. (IV-D-125), p. 2, Wisconsin Transportation Builders Association (IV-D-185))**

**RESPONSE:** We are finalizing the ABT program largely as proposed.

**COMMENT O:** The Tier 2 rule should permit ultra small vehicle manufacturers to generate credits through a scrappage program. **(Coalition of Small Volume Automobile Manufacturers, Inc. (IV-D-136))**

**RESPONSE:** We requested comment on the appropriateness of a scrappage program to provide credits for use by small certifiers. We expressed our concern in the preamble text of the NPRM that scrappage programs require careful design and oversight. The commenter requests that the Tier 2 program adopt a scrappage credit program and specify that the program would be implemented under a subsequent rulemaking. The commenter refers to rules promulgated by CARB governing voluntary scrappage programs. The commenter provides no specifics about how NO<sub>x</sub> credits for new vehicles could be properly generated from the scrappage of vehicles that are near the end of their lives. Consequently, we are unable to finalize a provision to establish a scrappage program or even to provide any guidance as to how such a program might operate within the context of the Tier 2 program.

However, we recognize that scrappage programs exist and believe they could be designed to provide NO<sub>x</sub> credits representative of the full life of a new vehicle. Because the commenter in this case indicated that the scrappage program could be implemented through a subsequent rulemaking, we see little need to finalize details in the final Tier 2 rule. The commenter and other interested parties should refer to EPA's guidance to states regarding vehicle scrappage programs developed in support of the "Economic Incentive Program" provisions of the Clean Air Act.

**COMMENT P:** EPA should not substitute (as suggested in the proposal) a number higher than the Tier 2 NO<sub>x</sub> standard to use in calculating the number of credits earned by Tier 2 vehicles. Instead, EPA should discount credits to generate a dividend for the environment and to account for potential in-use emission increases caused by higher sulfur fuel in the early years of the Tier 2 program. Also, EPA should not allow credit trading between NO<sub>x</sub> averaging sets. **(Union of Concerned Scientists (IV-D-195), p. 12)**

**RESPONSE:** While we asked for comment on a strategy for permitting the generation of additional early NO<sub>x</sub> credits that would allow manufacturers to count those credits from 0.10 g/mi rather than the Tier 2 standard of 0.07 g/mi, we are not finalizing such a provision. Nor are we finalizing to discount NO<sub>x</sub> credits as this commenter suggests. We believe, and other commenters have argued, that it will be difficult to generate substantial NO<sub>x</sub> credits under the final Tier 2 rule. We do not believe that discounting the NO<sub>x</sub> credits is an appropriate way to offset higher emissions that may occur in the early years of the program when low sulfur fuel is not universally available. This approach would disadvantage vehicle manufacturers because of a situation that is beyond their control (the sulfur level in gasoline). Lastly, as the commenter recommends we did not propose and are not finalizing to permit credit trading between NO<sub>x</sub> averaging sets.

**COMMENT Q:** EPA should make available NO<sub>x</sub> emission credits for early introduction of

interim HLDTs so that diesel vehicle manufacturers will have increased flexibility.  
**(Engine Manufacturers Association (IV-D-71), p. 20-21)**

**RESPONSE:** We have discussed our rationale for not proposing or finalizing provisions for early credits for the interim programs under Issue 7.D. above. We believe that the interim standards for HLDTs can be met by diesel and gasoline vehicles on the fuels that will be available in those years. We believe the bin structure in our interim program, as finalized, provides considerable flexibility to enable diesel vehicles as well as gasoline vehicles to comply with standards.

## **ISSUE 8: CERTIFICATION/IN-USE PROVISIONS**

**COMMENT A.1:** Supports the incorporation of the full useful life standards for the Supplemental Federal Test Procedures (SFTP), which is critical for ensuring that emissions during normal use (including aggressive driving and AC use) are properly estimated and controlled. Two commenters stated that full useful life standards for Tier 2 vehicles are consistent with EPA's mandate under the CAA. The 4000 mile standards exist in the federal program only because they were adopted in the NLEV program -- a voluntary program under which California requirements were adopted nationwide. **(American Lung Association (IV-D-167), p. 9, California Air Resources Board (IV-D-271), p. 3, NESCAUM (IV-D-130), p. 3-4, NESCAUM (Philadelphia - Day 1) (IV-F-131), STAPPA/ALAPCO (IV-D-67), p. 11, State of Connecticut, Dept. of Environmental Protection (IV-F-2)) (See other letter listed under Comment A.2 that follows.)**

**RESPONSE:** Our final rule includes provisions to apply full useful life standards for SFTP, in addition to the 4000 mile standards implemented by California. Our final provisions differ from those we proposed in the NPRM. We received extensive adverse comment on our proposed methodology from manufacturers and were persuaded that our proposed standards needed more review. The manufacturers' main arguments were that we lacked sufficient data to support the intermediate and full life standards we proposed and that manufacturers have little or no experience with SFTP compliant vehicles since the standards are not yet implemented. In the final rule we are adopting an approach that was set forth in the final SFTP rule that actually contemplated tighter FTP standards in the future and provided a methodology for deriving adjusted SFTP standards. (See preamble discussion in Part V and also the SFTP final rule 61FR54856.) See also other responses related to SFTP below.

We intend in the near future to initiate a rulemaking to fully examine issues related to SFTP standards and test procedures. As we currently plan, this rulemaking will look at standards, the applicability of test procedures to different engine and vehicle control technologies, and the deterioration of SFTP emissions over the useful lives of vehicles.

**COMMENT A.2:** EPA should also require that trucks meet the same standards as other vehicles during the SFTP cycle. **(Maine Dept. of Environmental Protection (IV-D-177), p. 4)**

**RESPONSE:** Both the standards for SFTP emissions that we proposed and those that we are finalizing include different standards for different categories of vehicles. Our final rule includes 4000 mile standards in harmony with California's which are different for each vehicle category (except for LDVs and LDT1s) and adds full life SFTP standards derived through a formula laid out in the final SFTP rule (see the response above). This formula ties the new SFTP standards to the original SFTP standards which were different for each vehicle category (except for LDVs and LDT1s). Consequently, our final standards are different for each category of vehicles (except for LDVs and LDT1s). We are also including PM standards for the SFTP that will apply to Tier 2 vehicles only. These were derived through a similar process as our other SFTP standards in this rulemaking. The first SFTP standards have not yet begun their phase-in. At this time we do not believe we have sufficient data to promulgate final full life standards for NMHC, NO<sub>x</sub> or CO that would differ from those contemplated in the final SFTP rule. We may, in a future rulemaking, examine the "off cycle emissions" and behavior of different categories of vehicles and propose common standards for all vehicle types.

**COMMENT B:** Tier 2 and interim LDVs and LDTs with diesel or gasoline engines should comply with the same NMHC + NO<sub>x</sub> and CO SFTP limits. LDT3 and LDT4 SFTP standards do not currently apply to diesels. Further the standards applicable to Tier 1 diesel LDVs and LDTs are less stringent than gasoline standards and do not apply to the SC03 cycle. This is unfair and inconsistent with the fuel-neutral approach. Since heavy-duty engine manufacturers have agreed not to exceed emission levels 1.25 times the applicable exhaust standards (including PM standards) when engines are operated over a wide range of operating conditions, it would be appropriate to establish a margin of 25% above the applicable FTP PM standard to serve as the SFTP standard. STAPPA/ALAPCO and ALA provide additional discussion regarding the SFTP requirements for Tier 1, NLEV, and Tier 2 vehicles and expresses support for the SFTP standards adjusted for intermediate and full useful life deterioration. **(American Lung Association (IV-D-167), p. 8-10, STAPPA/ALAPCO (IV-D-67), p. 10-12)**

**RESPONSE:** We agree that diesel vehicles and gasoline vehicles should meet the same SFTP standards and our proposal and final rule generally require diesel vehicles to meet the same SFTP standards as gasoline vehicles within the same vehicle category. However, in our final rule, because we lack data to conclude that diesels can comply with the 4000 mile SFTP standards, we are permitting diesel LDV/LLDTs in the interim program only to comply instead with intermediate life (50,000 mile) standards derived from the corresponding Tier 1 SFTP standards for gasoline vehicles as well as the corresponding full life SFTP standards. These vehicles are only a tiny fraction of the fleet even with an allowance for growth. We note that one manufacturer has expressed concerns to us about the ability of interim diesel vehicles to meet even the derived 50,000 mile SFTP standard option for diesels described above, because of its concerns about the performance of its diesel vehicles on the SC03 test. We believe, given the weighting of FTP, US06 and SC03 test results used to determine compliance with the SFTP standards that diesel vehicles will be able to comply

We describe in the previous response and in other responses under this issue why we are not finalizing the intermediate and full life standards we proposed, but rather are taking a different approach based on the original SFTP final rule.

With regard to establishing an SFTP standard for PM we are finalizing provisions that will lead to PM standards for the SFTP that will be derived through a parallel process and be of similar stringency to SFTP standards for the other pollutants. This process is described in detail in Section V. of the preamble to the final rule. This PM standard will not apply to the interim vehicles, but will be applicable to gasoline and diesel Tier 2 vehicles.

**COMMENT C:** EPA should add a PM standard to the supplemental test procedures for both spark ignition and compression ignition engines. **(NESCAUM (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** See our response under this Issue 8.B, above, for a discussion of SFTP PM standards. Consistent with our approach to hold all vehicles to the same standards, regardless of fuel, we are finalizing an SFTP PM standard applicable to both diesel and gasoline Tier 2 vehicles in this rulemaking. Our existing regulations allow manufacturers to demonstrate compliance with PM standards for gasoline vehicles, based upon data from similar technology vehicles. This reduces testing burden on gasoline vehicles which have very low PM emissions. We expect, as described in the RIA, that our Tier 2



standards and our requirements to reduce fuel sulfur will lead to large reductions in PM from gasoline vehicles. We expect to continue our practice of applying PM standards to gasoline vehicles, but permitting manufacturers to establish compliance for individual test groups through alternatives other than PM emission testing.

**COMMENT D:** EPA should defer SFTP useful life requirements for Tier 2 vehicles until additional data becomes available. Two associations state that EPA established the proposed SFTP standards improperly because it relied on false assumptions and inadequate data. The proposed SFTP standards would significantly increase the SFTP stringency for Tier 2 and may require manufacturers to certify 2003 MY vehicles to meet the 4,000 mile standards one year and to different intermediate and full-life standards the following year, which would significantly increase the cost and complexity of SFTP testing. AAM provides discussion supporting their assertion that there is insufficient data to support EPA's proposed SFTP standards and notes that manufacturers agree with EPA's proposal that TLEV vehicles, which are not subject to the new SFTP standards under the NLEV program, should continue to meet Tier 1 SFTP standards. For Tier 2 vehicles and HLDTs under the interim program, EPA should apply California LEV II 4,000 miles SFTP standards to maintain consistency with existing SFTP standards.

Another commenter argued that EPA does not have any data to justify the promulgation of SFTP standards for Tier 2 vehicles. In recognition of the fact that no data existed on the SFTP performance of LEV I type vehicles, California chose to only promulgate 4,000 mile standards instead of full-useful life standards, with the understanding that data would be collected on SFTP compliant vehicles when they become available and that full-useful life standards would be considered in the future. Since EPA knows that no data exist on the SFTP performance and deterioration of Tier 2 type vehicles, it should also defer promulgation of full-useful life standards to a future rulemaking. Section 206(h) places no obligation on EPA to promulgate any SFTP standards. If EPA plans to adopt SFTP requirements for Tier 2 vehicles, EPA should adopt the same 4,000 mile SFTP standards as California has promulgated for its LEV II program. If EPA feels that Tier 2 vehicles must have full-useful life SFTP standards, then it could require Tier 2 vehicles to meet the appropriate Tier 1 SFTP standards for the appropriate weight class. Similarly, since no SFTP data are available on diesel powered vehicles, EPA should not require diesel vehicles under the Tier 2 program to meet the Tier 1 gasoline vehicle requirements. As a recommendation, the commenter provides revised language for Section 86.1811(f).

Finally, another commenter argues that the proposal of revised SFTP standards, in advance of the implementation of the current SFTP standards, is premature. EPA's assumptions regarding the modification of the 4,000 mile SFTP standards to intermediate and full useful life standards and the deterioration of SFTP-compliant vehicles may not be appropriate and have not been proven. **(Alliance of Automobile Manufacturers (IV-D-115), p. 91-93, Cummins Engine Company, Inc. (IV-D-132), p. 18, DaimlerChrysler (IV-D-59), p. 4-5, Engine Manufacturers Association (IV-D-71), p. 15, Nissan North America, Inc. (IV-D-125), p. 5-6, Volkswagen of America, Inc. (IV-D-60), p. 9-10)**

**RESPONSE:** Our responses to Comments 8.A.1-.2 and 8.B explain that we are finalizing different full life SFTP standards than proposed. We are retaining the 4000 mile SFTP standards for harmony with California and implementing a set of full life standards based on a methodology prescribed in the final SFTP (61FR54856) rule for SFTP standards

under future, tighter FTP standards. Consistent with our overall approach to emission standards under this rule, we are finalizing that, within a given vehicle category, diesel and gasoline vehicles must meet the same SFTP standards. We are providing an exception that interim diesel LDV/LLDTs may elect to comply with 50,000 mile standards derived similarly to our full life standards, in lieu of complying with 4000 mile standards. This provision only applies to interim vehicles and will not apply to Tier 2 vehicles. We also note under Comment 8.A. above that we plan a rulemaking to thoroughly examine issues related to SFTP standards.

We have explained elsewhere in this document that Section 202(a) of the Clean Air Act requires that mandatory exhaust emission standards apply to the full useful life of the vehicle. Consequently, if we are going to apply SFTP standards to any category of vehicles under the interim or Tier 2 programs, they must apply to the full life of the vehicles.

**COMMENT E:** Data to support SFTP standards for diesel vehicles do not exist. The proposed SFTP requirements for diesel-powered vehicles are not supported with sufficient data. The imposition of the stringent SFTP standards as proposed may preclude the availability of diesel and other lean-burn vehicles technologies from the market. EPA should postpone the revision of the SFTP standards until the current SFTP standards are fully implemented and sufficient data exists to justify additional SFTP requirements for diesel-powered vehicles. One commenter noted that expanding the SFTP testing requirement to include diesels as proposed will have little impact on US06 test capability but will have a major impact on SC03 facilities. **(Alliance of Automobile Manufacturers (IV-D-115), p. 92, Engine Manufacturers Association (IV-D-71), p. 15, Volkswagen of America, Inc. (IV-D-60), p. 9-10)**

**RESPONSE:** As we explain in other responses under Issue 8, we are not finalizing the intermediate and full useful life SFTP standards we proposed. Rather we are finalizing an approach that will adopt the 4000 mile standards from California as proposed, but will use adjusted full life SFTP standards from Tier 1 which will reflect the change in the FTP component of the standard. In keeping with our overarching principal of applying the same standards regardless of fuel type, we are applying the same standards to both gasoline and diesel vehicles. We do not believe these standards will be difficult for manufacturers to meet, regardless of fuel type. Given the small number of diesel test groups involved, and the possibilities for carry over from one model year to another, we do not believe the standards we are finalizing will have a significant impact on testing facilities. See our response to Comment D above for a discussion of a provision we are adding in the final rule that applies to interim non-Tier 2 diesel LDV/LLDTs.

**COMMENT F:** EPA's proposal to require a combined durability/off-cycle test is redundant -- there is no CAA requirement for duplicative SFTP testing. EPA's NLEV program requires certification under the SFTP at 4,000 miles, which was adopted to establish harmony with the California certification test procedures. EPA's proposal to impose intermediate and full useful life SFTP standards is unexplained and arbitrary and capricious. EPA's proposed rule contains no SFTP test data indicating the need for intermediate and full use life SFTP standards or any data regarding the feasibility, cost or emission benefits of these standards. The intermediate and full useful life testing conducted under the FTP provides all the proof of durability EPA can rationally require and the 4,000 mi SFTP test is fully adequate to measure off-cycle emissions. EPA has

not demonstrated that the proposed SFTP standards meet the CAA requirements for technical feasibility and cost-effectiveness and in addition, there is nothing in the CAA that binds EPA and vehicle manufacturers to spending efforts on irrational and duplicative SFTP testing. GM cites to *Greater Boston Television Corp. v. FCC*, 444 F.3d 841,852 (D.C. Cir. 1970) and *Prill v. NLRB*, 755 F.2d 941, 942 (D.C. Cir. 1985) to support their assertion that EPA cannot alter past policy in this case. **(General Motors Corporation (IV-D-209), vol. 1, p. 60-63)**

**RESPONSE:** See responses to Issue 8, Comments D and E, above. To reiterate our view about our statutory mandate— Section 202(a) clearly requires that where we promulgate mandatory standards, those standards apply to the full useful life of the vehicle. Thus the 4000 mile SFTP test is not "fully adequate to measure off-cycle emissions".

We believe industry's main concern has been with the stringency of the proposed intermediate and full life SFTP standards. As we indicate above, our final rule includes full life SFTP standards derived from the Tier 1 SFTP standards by adjusting them for the change in the FTP component of the weighted SFTP standard. If the Tier 1 SFTP standards are technologically feasible and cost effective and the interim and Tier 2 FTP standards are also, then clearly the SFTP standards we are finalizing are technologically feasible and cost effective, because their net effect is to adjust the Tier 1 SFTP standards for the change in the FTP component of the weighted standard that has occurred due to this rulemaking.

**COMMENT G:** Supports EPA's proposed Tier 2 approach for the certification short test. **(Alliance of Automobile Manufacturers (IV-D-115), p. 88)**

**RESPONSE:** We are finalizing our approach to the certification short test as proposed. This approach, consistent with the CAP 2000 provisions will permit the use of "good engineering judgement" in lieu of test data to meet the certification short test requirements.

**COMMENT H:** Agrees that it is appropriate to test all vehicles under the same loaded vehicle weight (LVW) definition. **(Alliance of Automobile Manufacturers (IV-D-115), p. 80)**

**RESPONSE:** We are finalizing this provision as proposed, except that in response to industry comments we will permit ALVW testing of HLDTs, as an option until they are phased-into the Tier 2 standards, i.e., we will not require LVW testing of those vehicles during the interim program.

**COMMENT I:** EPA's proposal to extend the current highway NO<sub>x</sub> test, which is a required emission data vehicle (EDV) test, to all LDVs and L/HLDTs certified to either the interim or Tier 2 requirements is based on outdated vehicle technology and standards, making this provision obsolete. AAM provides the history behind why this provision was initially adopted in 1978 and an explanation of why it is obsolete. AAM cites to Advisory Circular, A/C No. 24-2, 12/6/78, and CARB Staff report 78-1-2, dated 12/23/77 as supporting documentation. EPA should either delete this requirement or allow manufacturers to provide a statement of compliance based on "good engineering

judgment," which is similar to what is allowed for the certification short test requirement. EPA should not require manufacturers to provide EDV data. **(Alliance of Automobile Manufacturers (IV-D-115), p. 89-90)**

**RESPONSE:** We believe that this commenter raises some valid points about the highway NO<sub>x</sub> requirement. However, we are very concerned about off-cycle emissions and we note that this is a NO<sub>x</sub> standard. We note also that California has retained this requirement in its Cal LEV II rule. Also, we note that vehicles tested for certification must receive a Highway fuel economy test, so we do not see additional burden of this requirement. We note that when data indicate a vehicle to be out of compliance with the requirement that HWFET NO<sub>x</sub> be no greater than 1.33 times the FTP NO<sub>x</sub>, the manufacturer is provided an opportunity to present engineering data to explain why the vehicle is actually in compliance.

**COMMENT J:** The truck idle CO test is unnecessary for current and future technology vehicles, inconsistent with EPA's current efforts to certify cars and trucks to the same standards, and redundant considering the Certification Short Test requirements. **(Alliance of Automobile Manufacturers (IV-D-115), p. 79)**

**RESPONSE:** Our current regulations (40 CFR 1826(b)(5)) permit a manufacturer to establish compliance with this requirement through a statement in the Application for Certification that, based upon an engineering evaluation, the trucks comply with the standard. Even though this is a minimal burden, we concur with the manufacturer's comment and are dropping this provision from the final rule for Tier 2 vehicles. This provision was established years ago under much higher CO standards to bring some repeatability to idle test measurements which could be used in state I/M programs. The standard, at 0.5%, is very high relative to the CO emissions of current technology vehicles. We believe that current defeat device requirements, certification short test requirements and the threat of State inspection/maintenance failures are adequate to ensure that manufacturers produce trucks that maintain low CO emissions, even at idle.

**COMMENT K:** It may not be cost-effective to measure methanol, ethanol and formaldehyde given the stringency of the proposed HC emission standards and the variability of current measurement techniques, which are highly vulnerable to reproducibility and accuracy problems. EPA should consider eliminating the mandatory measurement of alcohol and formaldehyde. **(Alliance of Automobile Manufacturers (IV-D-115), p. 54)**

**RESPONSE:** In our final rule we are permitting manufacturers to certify gasoline and diesel fueled vehicles to the NMOG standards using NMHC data. For gasoline and diesel fueled vehicles, NMHC and NMOG emissions are virtually identical, and manufacturers have argued that measuring NMOG emissions adds extra time and cost to each test.

Formaldehyde is an air toxic specifically recognized under section 202(l) of the Clean Air Act and we are retaining the formaldehyde standards. However, we recognize that the formaldehyde test result is essentially a by-product of measuring NMOG emissions and would not normally be obtained when measuring NMHC. Manufacturers might not benefit from the NMHC option if they still had to measure formaldehyde.

A review of certification data indicates that gasoline and diesel formaldehyde test results

from current vehicles under the NLEV program are typically far below the formaldehyde standards we are finalizing in our Tier 2 rule. Therefore, we are finalizing a provision to permit manufacturers to certify gasoline and diesel vehicles to the formaldehyde standards with test data from similar technology vehicles. This provision is much like a current provision which permits manufacturers to certify gasoline vehicles to the PM standard with data from similar technology vehicles. Formaldehyde data should be readily available since California requires NMOG testing and formaldehyde testing for nearly all vehicles.

Of course, manufacturers will remain liable for compliance with the formaldehyde and NMOG standards in-use.

In the case of alcohol and CNG-fueled vehicles, NMOG and NMHC emissions may be significantly different. Also, formaldehyde emissions are likely to be considerably higher than for gasoline and diesel vehicles. For these vehicles we are finalizing our proposal to require NMOG measurements and formaldehyde measurements.

**COMMENT L:** Under the more stringent Tier 2 standards, the variability of in-use compliance test results may increase due to a variety of reasons that are beyond a manufacturer's control. EPA should consider whether the compliance margins as proposed are appropriate given this increase in variability. **(Alliance of Automobile Manufacturers (IV-D-115), p. 56-57)**

**RESPONSE:** The Alliance cites design target levels we assumed in the Regulatory Impact Analysis and expresses its concern that vehicle variability under tight Tier 2 standards could be such that additional "headroom" above these design targets might be needed. The Alliance attributes the need for headroom to routine testing variation among vehicles, test sites and test labs; variation among parts including emission control parts; and variation in vehicle usage including loading, fueling, maintenance, climate, driving style, etc. Based on the above factors, the Alliance argues for additional time to comply with Tier 2 standards as would be available under its Tier 2 proposal.

We proposed and are finalizing separate temporary in-use standards that would apply in the early years of the program. We believe that these standards are sufficient to address the Alliance's concerns. These standards will apply for the first two years of production after a new test group is certified, provided the test group is certified to a bin having a full life  $\text{NO}_x$  value of 0.07 g/mi or less in 2007 or earlier (2009 or earlier for HLDTs). The relaxed standards provide roughly a 50% in-use cushion for  $\text{NO}_x$  above the certification standard. This cushion is in addition to the one that manufacturers design into their certification of the vehicle. We are also providing in-use standards for  $\text{NO}_x$  and PM emissions for diesels certified to bin 10 during the interim program, because of our concern that the low sulfur fuel these vehicles may require will not be widely available until the 2006-2007 timeframe. These in-use standards will apply for the duration of the life of bin 10 (through the 2008 model year). All of the in-use standards would apply to in-use testing conducted by the manufacturer under the CAP2000 program and to in-use testing conducted by EPA.

Our Tier 2 program provides considerable leadtime for manufacturers to design and prove out their Tier 2 calibrations, especially for HLDTs. We note that there are vehicles currently certified at levels close to those needed to comply with Tier 2 standards.

**COMMENTS M and N:** EPA should retain the proposal to allow relaxed interim in-use standards at 1.5 times the certification standards but should extend coverage to include all bins and should increase duration to four years. [Alliance proposal] Since federal standards cover such a large volume of vehicles, more flexible in-use standards are necessary. EPA should adopt in-use standards equal to twice the certification levels and apply them to the first four (not two) years that the standards are in use. **(Alliance of Automobile Manufacturers (IV-D-115), p. 85, Cummins Engine Company, Inc. (IV-D-132), p. 18, Engine Manufacturers Association (IV-D-71), p. 16, General Motors Corporation (IV-D-209), vol. 1, p. 60-63)**

**RESPONSE:** We are finalizing our provision for relaxed in-use standards generally as proposed, except for the inclusion of additional in-use standards for certain diesels in the interim program, as noted above. As we indicate above, we are providing substantial lead time for manufacturers to develop and prove out designs and we are providing temporary in-use standards which provide, for two years, a 50% tolerance above the standards for vehicles certified to the most stringent bins. We do not believe that a longer period of time is needed, except in the case of the interim diesels, given the leadtime available for manufacturers to develop technologies and evaluate them for in-use durability.

**COMMENT O:** It is unnecessary to adopt controls for system leaks since the existing and proposed programs provide more than adequate protection. This potential problem will not lead to a failure in meeting FTP and SFTP emission standards in-use. **(Alliance of Automobile Manufacturers (IV-D-115), p. 103, Engine Manufacturers Association (IV-D-71), p. 18)**

**RESPONSE:** We remain concerned about the impact that very small leaks can have on the ability of a vehicle to meet standards as stringent as those we are finalizing under the Tier 2 program. We believe that there are available leak-resistant designs that will help ensure that exhaust systems can be assembled, installed, used, and even disassembled for repair and reassembled, that will prevent leakage of air to catalysts and oxygen sensors. As we explain in the preamble to the final rule, data shows that extremely small leaks can have significant effects on the abilities of oxygen sensors and catalysts--especially NO<sub>x</sub> reduction catalysts to do their jobs. In the final rule we are adopting a requirement that manufacturers provide a statement with the Application for Certification indicating that an engineering analysis of the complete exhaust system has been performed to ensure that the exhaust system has been designed to facilitate leak-free assembly, installation, operation and repair to a point beyond the last catalyst and oxygen sensor.

**COMMENT P:** The requirement to conduct separate evaporative emissions durability testing with a new and unique fuel (containing 10 percent ethanol) is burdensome and unnecessary, since manufacturers already test evaporative durability to simulate real world deterioration. EPA should delete the 10 percent ethanol in evaporative durability fuel requirement. AAM provides background information and discussion regarding ethanol regulation and asserts that EPA is placing the burden of this problem on vehicle manufacturers by requiring them to document that evaporative components are made of materials whose permeability is not significantly affected by alcohols. It is EPA's responsibility to make sure that fuels are not introduced into commerce that will compromise vehicle emission control systems. The CAP 2000 rule, allows manufacturers to develop their own durability process for calculating evaporative

emission deterioration factors using "good engineering judgment" and was just published in June 1998. EPA should not seek to make changes to that rule before EPA or manufacturers have had an opportunity to develop any experience with it. **(Alliance of Automobile Manufacturers (IV-D-115), p. 94-95)**

**RESPONSE:** We continue to believe that some materials available for use in evaporative emissions control systems may deteriorate in-use due to long-term exposure to alcohol in fuels. As noted in the NPRM, we have reviewed data indicating that the permeability, and therefore the evaporative losses, of hoses and other evaporative components can be greatly increased by exposure to fuels containing alcohols.<sup>2</sup> Alcohols have been shown to promote the passage of hydrocarbons through a variety of different materials commonly used in evaporative emission systems. Data from component and fuel line suppliers indicate that alcohols cause many elastomeric materials to swell, which opens up pathways for hydrocarbon permeation and also can lead to distortion and tearing of components like "O" ring seals. Alcohols do not impact evaporative components and hoses immediately, but rather it may take as long as one year of exposure to alcohol fuels for permeation rates to stabilize. The end result is higher permeation and increased in-use evaporative emissions.<sup>3</sup> Commenters did not comment or provide data contradicting these findings.

Other available materials and system designs are not negatively affected by the fuels. Alcohol-resistant materials such as fluoroelastomers are available and are currently used by manufacturers to varying extents. We continue to believe that it is appropriate to require assurance during the certification process that the materials chosen by manufacturers for the new Tier 2 evaporative emissions control systems are not significantly impacted in-use by alcohol in the fuel.

In response to the comment that EPA should not change the CAP 2000 provision allowing manufacturers to develop their own durability process for calculating evaporative emission deterioration factors using "good engineering judgement", we agree in principle. We do not wish to curtail manufacturer flexibility provided by CAP 2000, but only seek to ensure that the process accurately predicts in-use deterioration. As long as the demonstration ensures that the materials selected by manufacturers are not susceptible to alcohol related deterioration over the useful life of the vehicle, we believe the objective of the proposal would be met. The proposed testing changes would be one way to make the required demonstration but other methods may be equally valid.

We requested comment on alternative ways by which a manufacturer could document or demonstrate that its components are made of materials whose permeability is not significantly affected by alcohols but we did not receive any comment in this area. Still, other appropriate methods may be available or may be developed in the future. Other methods that may be acceptable include developing and using a consensus test procedure or standard that we could rely on to establish whether a fuel/evaporative

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<sup>2</sup> Numerous SAE papers examine the permeability of fuel and evaporative system materials as well as the influence of alcohols on permeability. See, for example SAE Paper #s 910104, 920163, 930992, 970307, 970309, 930992, and 981360, copies of which are in the docket for this rulemaking.

<sup>3</sup> Ibid

system is likely to be sufficiently impermeable to alcohol fuels. In addition, there may be other ways to demonstrate materials are sufficiently impermeable. In our final rule, we are providing an option such that manufacturers may use engineering judgement acceptable to EPA to demonstrate that their evaporative systems will be durable in the prolonged presence of alcohol fuels. The use of alcohol resistant materials as documented in the literature may be one such way.

The commenter believes that the effects of alcohol containing fuels on emission control components should be addressed through Section 211(f) of the Clean Air Act (CAA), which deals with fuels and fuel additives, rather than through additional burdens on the vehicle manufacturers. We disagree with this comment based on Section 211 (c) of the CAA which requires EPA to consider other technologically or economically feasible means of achieving emissions standards prior to controlling or prohibiting the sale of a fuel additive. The approach we are finalizing is clearly feasible at a reasonable cost. (The entire cost to comply with our more stringent Tier 2 evaporative standards which includes the use of materials resistant to alcohols is only about \$4 per vehicle). Therefore, we believe that the approach recommended by the commenter is not an appropriate response under the CAA to our narrow concern regarding evaporative emissions system durability.

The commenter provides a detailed overview of the history of the use of ethanol in gasoline and discusses the fact that EPA has not acted on a concern about materials deterioration in the past. In addition to the data cited above, we believe it is appropriate to adopt the provisions now for three reasons. First, we expect that the new evaporative standards would require some redesign and testing of the evaporative systems and it is appropriate to ensure that manufacturers consider the materials they use up front during this process. We believe this would be better for all parties than having to address the issue in response to in-use failures after several years of vehicle sales. Second, the new evaporative emissions standards are more stringent than current standards and deterioration of components are therefore more likely to lead to in-use failures. Manufacturers are likely to have less room for cushion between the standard and their certification level with the more stringent standards. Finally, the use of ethanol in gasoline may increase in the future due to potential future limits on the use of MTBE, also increasing the potential for in-use problems due to material deterioration. For all of these reasons, we believe it is prudent to ensure that manufacturers consider the effects of ethanol on materials during the certification process of their new evaporative emissions control systems.

**COMMENT Q:** EPA's proposed new test fuel for all 2004 MY and later vehicles differs from current certification fuel, which creates an unnecessary and unmanageable certification workload in 2004 with little emissions benefits. **(Alliance of Automobile Manufacturers (IV-D-115), p. 53)**

**RESPONSE:** Industry commenters were particularly concerned about the workload placed upon interim LDV/LLDTs by our proposal. In general, their arguments were persuasive that we should include flexibility in the final rule to enable carry over from the NLEV program into the 2004 model year. While our goal in the NPRM was to shift all vehicles into Tier 2 provisions as early as possible, it was not our intention to create a situation where there could be no carryover from 2003 into the interim program or carry across from the Cal LEV I program. We recognize that the LDV/LLDTs in the interim program have fairly short "shelf lives", i.e. they will need to be phased-out soon, and we



do not believe it adds significant value or air quality benefit to have manufacturers simply recertify those vehicles on a different test fuel.

In the NPRM, we indicated that we believe vehicles should be certified on a test fuel representative of the fuel they will see in-use. Recognizing the need to harmonize with California to minimize testing burden, we proposed to accept test results on California Phase II fuel when the vehicles were certified for 50 state sales, but we indicated that we might conduct or require in-use testing of those vehicles on Federal fuel, in other words, that we would hold the manufacturers responsible for the performance of those vehicles when tested on Federal fuel.

We believe the manufacturers' workload concern related to this issue stems from their fear about the performance of the vehicles when tested in-use on Federal fuel. Some manufacturers may feel it necessary to recertify an NLEV or Cal LEV I vehicle to gain confidence of in-use performance when tested with federal fuel and we recognize that manufacturers may have certified NLEV vehicles with the understanding that those configurations would only be in-use tested on California Phase II fuel. Consequently, to ease the carry over of NLEV vehicles into the interim program in our final rule, we are providing that interim vehicles carried over from the NLEV program or carried across from the Cal LEV I program will be in-use tested on whichever test fuel they were certified on.

As many LDT3s and LDT4s in the interim program are likely to be carry-over configurations from the Cal LEV I program for MDV2s and MDV3s, we are also applying this provisions to HLDTs. Similarly Medium Duty Passenger Vehicles (see Issue 39) in the interim program may be carried across from the Cal LEV I program for MDVs and we will also apply these provisions to them.

**COMMENT R:** EPA should allow the use of California certification test fuel and/or should harmonize federal test fuels with California test fuels. EPA should update its test fuel requirements and match new, ultra-clean vehicles with ultra clean test fuels by requiring certification and in-use test fuels to meet a near-zero sulfur standard along with other constraints on volatility, additives to prevent combustion chamber deposits and other parameters. For the federal certification test fuels, lowering the sulfur cap from 1000 ppm to 80 ppm seems helpful but 80 ppm would still be too high. California certification fuel is averaging about 15-20 ppm sulfur. In addition, the results of California evaporative testing should prove acceptable for federal purposes. EPA should continue to accept certification results on California test fuel. **(Alliance of Automobile Manufacturers (IV-D-115), p. 53, 55)**

**RESPONSE:** As we indicated in the preamble to the NPRM and as we have indicated in response to comments above, we believe that vehicles should be tested on fuels representative of those fuels they are likely to see in use. As we explain in other areas of this document, we do not believe that the near zero sulfur fuel proposed by the Alliance is necessary to meet the standards we are finalizing. While we have made efforts to harmonize as much as possible with California, we are not finalizing a program that will require sulfur levels as low as those required in California. Also, California requires oxygenates and specifies a lower RVP (Reid Vapor Pressure) for its test fuel to better match commercial fuels required to be sold in that state.

The Alliance argues that the 80 ppm cap we are proposing on sulfur will still be too high.

While it is possible that some in-use fuel will have sulfur levels that high, we believe that it is unlikely that a vehicle will see significant quantities at that level. Our fuel standards also include a 30 ppm sulfur average, which will drastically limit the amount of fuel that can be sold at or near 80 ppm.

As we indicated in the preamble to the NPRM and as we have indicated in response to other comments, we are finalizing to accept results of exhaust certification testing conducted on California Phase II fuel for 50 state configurations. We asked for comment and supporting emission data as to whether we should accept results of evaporative testing performed on California test fuel showing compliance with the more stringent California evaporative standards. Although the Alliance commented that we should accept such data, no commenter provided any emission data to support that position. Consequently, we are finalizing to require that compliance with federal evaporative emission standards be demonstrated using federal test fuels. However, because it seems reasonable that vehicles meeting California's more stringent evaporative standards might also meet federal standards even with differences in test fuel and test procedure, we are providing an option that manufacturers may submit California evaporative data, provided they receive advance approval based on testing data from EPA.

**COMMENT S:** EPA is unnecessarily extending the 120K mile standards to cover non-Tier 2 LDV and LLDT, which greatly adds to the burden for both industry and government and provides little emissions benefits. By extending the 120,000 mile useful life requirement to non-Tier 2 vehicles, EPA has discarded an important advantage of the NLEV program, which allows manufacturers the opportunity to streamline both development and certification processes and to harmonize them with the California program. Re-certifying these non-Tier 2 vehicles will require new durability programs, new emission data vehicle testing and new certification work. [See also Issue 2.3] **(Alliance of Automobile Manufacturers (IV-D-115), p. 52-53, 81)**

**RESPONSE:** We proposed to initiate the requirement that full useful life be 120,000 miles for all vehicles beginning in 2004. Manufacturers have pointed out that that requirement alone would preclude all carry over from 2003 for LDV/LLDTs and necessitate the recertification in 2004 of all those vehicles. This was not our intention. In the final rule, to facilitate carryover from the NLEV program, we are permitting the use of the 100,000 mile useful life for the interim vehicles. We did not tie any air quality benefits to the extended useful life of the interim vehicles in the NPRM and we do not see any significant air quality impact of this change.

**COMMENT T:** Including intermediate (50K mile) full useful life standards in the Tier 2 program would significantly affect certification workload by increasing the amount of time required to run durability programs and conduct certification testing. EPA should eliminate this requirement. [See also Issue 2.3, Comment D] **(Alliance of Automobile Manufacturers (IV-D-115), p. 53, Engine Manufacturers Association (IV-D-71), p. 15)**

**RESPONSE:** We proposed intermediate life standards for bins having NO<sub>x</sub> values of 0.07 g/mi and above. We are finalizing these standards generally as proposed except that we are aligning certain CO and HCHO values with California. We do not agree that intermediate life standards significantly increase workload. First, they already exist; second, California has intermediate life standards for the 0.07 bin; and third, carry over

of certification from year to year greatly reduces certification workload. However, in the final rule we are providing that intermediate life standards are optional under certain conditions. See Issue 2.3.B.1

**COMMENT U:** EPA should base the hydrocarbon standards for gasoline powered vehicles on NMHC instead of NMOG and should allow companies to demonstrate compliance with formaldehyde (HCHO) standards by using engineering analysis. Manufacturers disagree with EPA's assertions that the requiring NMOG measurements would not create an additional burden in the process of testing the vast majority of gasoline powered vehicles. If EPA does not allow the use of RAFs, then the benefit of measuring NMOG emissions instead of non-methane hydrocarbons (NMHC) is eliminated. Measuring NMOG requires significantly more time and resources than measuring NMHC. Automakers could satisfy the federal need equally well with the less expensive and less burdensome NMHC measurement. Also, since much of the additional test cost needed to measure NMOG is also needed to measure formaldehyde, EPA should allow companies to use engineering justifications to demonstrate compliance with formaldehyde standards. **(Alliance of Automobile Manufacturers (IV-D-115), p. 59-61, Nissan North America, Inc. (IV-D-125), p. 6-7)**

**RESPONSE:** See our response to Issue 8.K, above.

**COMMENT V:** EPA should allow manufacturers to test alternative fuel vehicles using the NMOG procedures and apply the same reactivity adjustment factors (RAF) as used in California. RAFs provide a valuable additional tool for understanding ozone formation and have been important for helping emission test results accurately reflect the impact of vehicles on ozone levels. Without RAFs, alternative fueled vehicles may not be able to meet the Tier 2 standards. **(Alliance of Automobile Manufacturers (IV-D-115), p. 59-60, California Air Resources Board (IV-D-271), p. 3)**

**RESPONSE:** We indicated in the NPRM that we were not proposing to permit the use of RAFs for vehicles in the Tier 2 program. We expressed our reservations about the applicability of California's RAFs nationwide and indicated that we were awaiting the results of a National Academy of Sciences review of these factors. That report evaluated whether EPA's assessment of reformulated gasoline blends should be based upon their different reactivities and not just upon the mass of the emissions.<sup>1</sup> That report is still being reviewed by EPA and we have not developed a position on the nationwide applicability of California RAFs. However, the conclusions reached in the NAS report suggest that assessment of reactivity is of limited value, especially in NO<sub>x</sub>-limited areas.

The Alliance argues that without RAFs, manufacturers may be unable to certify alternative fueled vehicles outside of California where RAFs are permitted. The Alliance asserts that it would be unfortunate to lose these vehicles, since some have very low NO<sub>x</sub> emissions. The Alliance cites the impact that RAFs can have on NMOG measurements but provides no data to support its argument that without RAFs

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<sup>1</sup>Ozone Forming Potential of Reformulated Gasoline, National Research Council, National Academy of Sciences. National Academy Press, May 1999. Available on the National Academy Press web site at [www.nap.edu/books](http://www.nap.edu/books).

manufacturers may be unable to certify alternative fueled vehicles outside of California. We believe that if gasoline and diesel vehicles can meet the standards we are proposing, then a vehicle operating on a cleaner, simpler fuel should be able to meet the standard without RAFs, given that the exhaust products of the fuel will be simpler and more easily handled by the catalyst. Data available to us indicates that when alternative fueled vehicles are optimized to the fuel, they are capable of very low emissions.

We note that our NPRM and final rule contain a provision consistent with the Cal LEV program that permits flexible fueled and dual fueled and multi fueled vehicles to choose the NMOG standard from the next higher bin when certifying the vehicle to operate on gasoline.

**COMMENT W:** Industry may have some difficulty measuring NMOG and NO<sub>x</sub> to the low levels that would be required under Tier 2. Industry has very little experience with extremely low measurements of NMOG and NO<sub>x</sub>. Manufacturers have determined that the current critical flow venturi (CFV) system with accepted and approved technology produces unsatisfactory and inaccurate results at extremely low levels. Advanced emission measurement systems must be developed to provide accurate measurements. **(Alliance of Automobile Manufacturers (IV-D-115), p. 54)**

**RESPONSE:** We recognize that measurement at very low levels such as those expected from Tier 2 vehicles poses challenges. However, we are encouraged by what we've seen to date in our correlation programs with industry. One correlation program, with which this commenter should be familiar, produced repeatability of NO<sub>x</sub> measurements at the SULEV level (0.02 g/mi) on the order of 0.0026 g/mi or about 13% of the lowest bin where we expect any significant number of vehicles to fall. NMHC repeatability was not as good, (<0.005 g/mi) but was still very low relative to the standards for most of our bins.

**COMMENT X:** EPA should reconcile the disconnect between certification/in-use audit gasoline and conventional gasoline, particularly with respect to sulfur content, to ensure that this compliance testing reflects real-world conditions. **(STAPPA/ALAPCO (IV-D-67), att. 2, p. 3, STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77))**

**RESPONSE:** As we said in the preamble to the NPRM, we believe that vehicles should be certified and in-use tested on the fuels which they are most likely to use. To that end, for Tier 2 vehicles, we are holding manufacturers responsible for in-use compliance on federal fuel. To ease certification workload and facilitate carryover and carryacross, we will accept certification results from California fuels. But a manufacturer who elects to certify in the federal Tier 2 program does so at its own risk because it will be expected to be able to prove compliance in-use using federal fuel.

For interim vehicles, where certification is meant to be based on NLEV and Cal LEV I programs to the extent possible, we received extensive and convincing comments about workload and the need to be able to carry over configurations without additional certification work. For the interim program, we are finalizing to handle test fuels consistent with our NLEV approach which is to accept results of exhaust certification testing done on California fuels, and if certified on California fuels, and carried across from the Cal LEV I program, we will conduct and permit manufacturers to conduct in-use

testing on California fuel. See also our response to Issues 8Q and 8R.

**COMMENT Y:** To avoid potential equipment problems associated with lower sulfur fuel, EPA should allow adequate time for complete analysis and testing of any new fuels on both new and in-use vehicles. **(American Trucking Associations (IV-D-70), p. 5)**

**RESPONSE:** This final rule does not specifically address diesel fuel sulfur. This comment would be better directed to the NPRM on diesel sulfur which we expect to be published early in 2000. Given the market share of light-duty diesel vehicles and trucks, our phase-in schedule essentially provides LDVs and LLDTs until 2007 to meet the Tier 2 standards. At that point, diesel HLDTs will only have to meet the interim standards. Diesel HLDTs will have until 2009 to meet the final Tier 2 standards. As discussed earlier, we are currently evaluating, in another proceeding, whether to promulgate regulations requiring low sulfur diesel fuel for motor vehicles.

We believe our phase-in schedule affords ample time for diesel vehicle manufacturers, their associations, oil companies, this commenter and other interested parties to work together to assure that engines and low sulfur diesel fuels are compatible.

**COMMENT Z:** The minimum sulfur content of gasoline used in the certification process should be set, at a minimum, to the highest allowable sulfur level (cap level). [See related Comments P, Q, R, and X under this Issue 8.] **(American Petroleum Institute (IV-D-114), p. 146-147)**

**RESPONSE:** As we have said in numerous other responses, we believe that vehicles should be certified and in-use tested on fuels they can expect to see in-use. While it is intuitively appealing to require testing on the "worst case" fuel, because of the requirement that fuel meet an average Sulfur level of 30 ppm, we do not believe that vehicles will see significant amounts of fuel at the highest allowable level. Consequently, we are setting the specification for federal Tier 2 test fuel at 15-80 ppm recognizing that some in-use fuel will be below 30 ppm and some will be above and that some could be as high as 80ppm. EPA will not use test fuel having a sulfur level above 45 ppm.

**COMMENT AA:** Opposes interim in-use standards that are equal to 1.5 times the certification standard for four years. [See contrary position in Comments M and N under this Issue 8.] This just further delays most of the Tier 2 standards for auto manufacturers. If EPA grants a four year delay for the purpose of allowing the Alliance more time to prove out technology that the EPA has already established is currently available in a large number of vehicles, the agency must also grant a four year delay until 2008 for the oil industry to develop competitively proven and lower cost desulfurization technologies for reaching the proposed 30 ppm sulfur average. **(American Petroleum Institute (IV-D-114), p. 149, Marathon Ashland Petroleum LLC (IV-D-81), p. 68))**

**RESPONSE:** We do not agree that our temporary in-use standards, will further delay the Tier 2 standards for auto manufacturers. Nor do we agree that the existence of an in-use compliance tolerance necessitates a delay for the oil industry to comply with the sulfur requirements of the rule. Manufacturers certify motor vehicles to meet emission standards and must be confident that the vehicles will meet standards in-use for the useful life of the vehicle. Manufacturers must design in many safeguards to assure that

the vehicles will meet standards given the realities of differing deterioration due to different drivers, climates, terrain, mileage accumulation cycles, road salt, altitude, fuels, etc. Manufacturers who err can be liable for substantial expense if a recall results. We are concerned that in-use liability could have a "chilling effect" on introduction of new technology and the manufacturer might delay promising technologies out of fear of in-use liability. We do not believe that the existence of an in-use tolerance will lead manufacturers to design to less stringent emission targets. Ultimately, of course, all vehicles must meet the certification emission standards for their full useful lives.

No parallel exists between this issue and the refiners' need to produce low sulfur fuel. The refiners do not produce a product that deteriorates in-use, or that must meet a specific standard for 10 years. To some degree the average cap approach we are providing for gasoline gives refiners similar flexibility, especially during the three year phase-in.

**COMMENT BB:** Opposes use of alcohol fuels for certification testing that contain the highest legal quantities of ethanol available in the U.S. The EPA has not adequately justified this requirement in the context of permeability concerns, and until the MTBE issue is settled, this requirement is not appropriate. **(Nissan North America, Inc. (IV-D-125), p. 6)**

**RESPONSE:** See our response to Issue 8.P, above. Ethanol is widely used in gasoline today. We do not believe it is appropriate to wait to resolve this issue until the questions surrounding MTBE are settled. In fact, our concern is that if there is a reduction in MTBE usage, there may be even more ethanol added as an oxygenate which will increase—not decrease -- our concern about this issue.

**COMMENT CC:** Supports use of "worst-case" in-use fuels containing alcohols given the concerns about permeation emission rates. **(California Air Resources Board (IV-D-271), p. 4)**

**RESPONSE:** See our response to Issue 8.P, above.

**COMMENT DD:** EPA should incorporate CA ZEV test procedures. If EPA wants to incorporate CA HEV test procedures, EPA would have to provide a method for determining HEV fuel economy. Another commenter recommends that EPA adopt CARB's HEV test procedures. **(California Air Resources Board (IV-D-271), p. 3, Massachusetts Department of Environmental Protection (IV-D-137), p. 5)**

**RESPONSE:** We are adopting California HEV and ZEV procedures as proposed. We have issued guidance on how we will perform fuel economy testing on HEVs. The Honda Insight hybrid electric vehicle was recently certified using these procedures.

## ISSUE 9: SMALL CERTIFIERS OF VEHICLES

**COMMENT A.1 - .2:** EPA should make specific provision for small volume manufacturers. One commenter states that EPA must implement a policy that affords lead-time to ultra small vehicle manufacturers (USVMs). It can best do this by creating a new category or manufacturers selling fewer than 3,000 cars in the U.S. annually. Others suggest that small volume certifiers should be allowed to comply at the end of the phase-in period; any mandatory Tier 2 compliance date should not be before MY 2007. USVMs must compete with the larger manufacturers for technology, equipment, and engineers, and their costs are proportionally much higher. **(Alliance of Automobile Manufacturers (IV-D-115), p. 101-102, Coalition of Small Volume Automobile Manufacturers, Inc. (IV-D-136)) (See other letters listed under Comments A.3 and A.4 that follow.)**

**RESPONSE:** We proposed and are finalizing that small volume manufacturers, i.e. those that produce 15,000 or fewer vehicles per year, will have to comply with the interim standards for LDV/LLDTs in 2004 and with the interim standards for HLDTs in 2004, but they will not be subject to the phase-in percentages of the corporate average NO<sub>x</sub> standards for interim HLDTs or for Tier 2 LDV/Ts except for the 100% phase-in requirement in the applicable final year. To do this does not require that we establish a new category for Ultra Small Vehicle Manufacturers as the commenter suggests. Other commenters provided more detailed comments on this issue. Their comments are summarized below.

**COMMENT A.3:** EPA should eliminate the 25 percent minimum requirement for the alternative phase-in provision. Some manufacturers have only a few engine families in the LDT3 or LDT4 groups. To illustrate the burden, a manufacturer with only one engine family in this group would have to introduce 100 percent of the family starting in the first year, even though EPA would require only a 25 percent per year phase-in. The alternate phase-in process fails to assist the manufacturer because the 25 percent minimum requirement means 100 percent in this case. The easiest solution to this limitation would be to eliminate the 25 percent minimum. **(Alliance of Automobile Manufacturers (IV-D-115), p. 101-102)**

**RESPONSE:** We did not propose and are not finalizing any special provisions regarding phase-in percentages for manufacturers who are not small volume manufacturers. The commenter cites a scenario of a manufacturer having only one HLDT family. For that manufacturer, a 25% phase-in requirement essentially means 100%. Consequently, our provisions for alternative phase-in schedules, which include a minimum sum of 25% by 2004 for LDV/LLDTs in the Tier 2 program, or for HLDTs in the interim program provide little benefit to such a manufacturer.

The air quality benefits of our program are tied in part to the phase-in we outlined in our proposal. Also, states are extremely interested in the early benefits of the program. In the scenario cited by the commenter, the one engine family could be very large. To postpone the phase-in of those vehicles because the manufacturer had only one HLDT test group would create an inequity for other large manufacturers and could have an air quality impacts. We note that our percentage phase-in requirements were set up to enable manufacturers to spread the workload of redesign over a number of years. Clearly, a manufacturer with only one test group has less workload to begin with. Also, we note that manufacturers are not required to change over all vehicles from a test

group, but rather to meet phase-in requirements as a percentage of sales. A manufacturer such as the one cited in the commenter's example, could continue producing the previous test group to the previous standards (where appropriate), and produce vehicles to the new standards only as needed to meet the primary or alternative phase-in requirements.

**COMMENT A.4:** EPA should implement a case-by-case hardship relief mechanism that could delay required compliance by USVMs that demonstrate that they would face a severe economic impact. **(Coalition of Small Volume Automobile Manufacturers, Inc. (IV-D-136))**

**RESPONSE:** Our final rule includes a hardship provision that permits small volume manufacturers to apply for an extra year to comply with the 100% phase-in dates in the final rule. Note that small volume manufacturers are already exempted from the intermediate phase-in dates (e.g. 25%, 50% and 75%). The hardship provision would allow small volume manufacturers faced with severe economic consequences to apply for and receive, on a case-by-case basis, an additional year to meet any of the 100% requirements in our final rule.



## ISSUE 10: EVAPORATIVE EMISSIONS

**COMMENTS A and B:** Supports the proposed evaporative emissions standard. The evaporative emission standards should not be any more stringent than those proposed by EPA. The standards adopted by California have not been proven to be technologically feasible and remain the subject of a technology review in the 2000 calendar year. Manufacturers cannot afford to postpone development of more advanced evaporative emission control systems until this review takes place. Manufacturers are currently working on systems and vehicle design features that significantly reduce evaporative emission losses. Two commenters support not only the evaporative emissions standards, but also the proposed useful life period for these standards. **(Alliance of Automobile Manufacturers (IV-D-115), p. 84, 86, American Petroleum Institute (IV-D-114), p. 150, Marathon Ashland Petroleum LLC (IV-D-81), p. 69, National Automobile Dealers Association (IV-D-129), p. 3, STAPPA/ALAPCO (IV-F-117), Volkswagen of America, Inc. (IV-D-60), p. 8-9)**

**RESPONSE:** We are finalizing the evaporative standards and evaporative useful life provisions as proposed. We indicated in the preamble to the NPRM that these standards are at levels already being met by many vehicle models, but that the new standards would serve a benefit by protecting against backsliding as manufacturers seek cost savings. We considered the standards which have been promulgated by California, but we are not certain of the abilities of vehicles to meet those standards on federal fuels which have a higher vapor pressure than California fuels.

**COMMENT C:** EPA should address the issue of how to measure very low vehicle evaporative emissions relative to background non-fuel emissions. Testing vehicles for evaporative emissions occurs inside airtight chambers, but other liquids used in the vehicle besides fuel may raise background levels of organic emissions. As EPA tightens the evaporative standard, these emissions become larger relative to the total amount of measured vapor. Automakers cannot control the concentration or volume of background solvent emissions from 134A coolant and the washer solvent reservoir, and these emissions have already begun confounding test results during the diurnal measurement step, which will get worse under Tier 2. EPA should allow automakers to remove or wash the washer solvent reservoir during the evaporative emissions test, and should address how to measure and subtract evaporative emissions of non-fuel sources when they are present. **(Alliance of Automobile Manufacturers (IV-D-115), p. 54)**

**RESPONSE:** Our current regulations under the CAP2000 rule specify at 40 CFR 86.1810-01(j)(2) that, for certification vehicles only, manufacturers may conduct testing to quantify non-fuel background emissions for an individual test vehicle. Those background emissions may then be subtracted from the evaporative emission test results for the certification vehicles if approved in advance by EPA.

With regard to the impact of this comment on in-use evaporative emission testing, we have placed in the docket a letter sent jointly to the California Air Resources Board by the Alliance of Auto Manufacturers and the Association of International Automobile Manufacturers. That letter indicates that work is currently underway through the American Industry/Government Emissions Research Group (AIGER) to refine methods for measurement of these substances in SHED samples. We may address this issue for in-use evaporative emission testing when AIGER's work is complete.

**COMMENTS D.1 - .3:** EPA should tighten the current HC emission standards in the process of considering tighter Tier 2 exhaust emission standards. Three groups argue that some areas of the country need significant additional hydrocarbon control to attain the ozone NAAQS and all areas of the country need lower NMHCs to reduce toxic emission exposure. Some of these commenters note that evaporative HC emissions from Tier 1 and LEV vehicles exceed exhaust NMHC emissions in-use, as the former include running losses, hot soak emissions, diurnal emissions, and resting losses. STAPPA/ALAPCO lists a number of technologies that could be used to reduce these emissions and notes that because of the contribution these HCs make to ozone formation and toxic exposures, EPA should require the most stringent evaporative controls that are feasible and cost effective. California has found a 75 percent reduction feasible; EPA should adopt the same degree of control (instead of 50 percent). Other methods of addressing this concern include eliminating the highest emission bins [see Comment 3.1.A.1-A.8] and using a combined NMOG and NO<sub>x</sub> curve [see Comment 2.3.E.1].

Another commenter added that the Tier 2 rule's proposed evaporative emission standards are roughly 60 percent less stringent than the California LEV II standards. Evaporative emissions will soon overtake tailpipe VOC emissions as the dominant source of toxic emissions in the country. Ambient levels of benzene, formaldehyde, and 1,3 butadiene exceed health-based benchmark standards by more than an order of magnitude in many areas of the country. EPA should strongly consider strengthening the Tier 2 evaporative emission standards. Finally, numerous groups recommend that EPA adopt CA standards. (**American Lung Association (IV-D-167), p. 7-8, American Lung Association of Gulfcoast Florida (IV-D-108), American Lung Association of New Jersey (IV-D-211), American Lung Association of Santa Clara-San Benito (IV-D-106), American Lung Association of South Dakota (IV-D-94), American Lung Association of Virginia (IV-D-153), Appalachian Mountain Club (IV-D-251), California Air Resources Board (IV-D-271), p. 4, Chicago Dept. of the Environment (IV-D-200), p. 4, International Center for Technology Assessment (IV-D-122), p. 2, 8, Maine Dept. of Environmental Protection (IV-D-177), p. 3-4, Massachusetts Department of Environmental Protection (IV-D-137), p. 5-6, NESCAUM (IV-D-130), p. 4, STAPPA/ALAPCO (IV-D-67), p. 8-9**)

**RESPONSE:** As we explained in the preamble to the NPRM, we chose a NO<sub>x</sub> focus for the Tier 2 rule because modeling showed that NO<sub>x</sub> reductions had more potential for ozone benefits than did reductions in VOCs. Also, we believe that nonattainment areas have a broader range of alternative control opportunities for VOCs than they do for NO<sub>x</sub>. While we believe manufacturers can meet the evaporative standards we proposed cost effectively, we have no data, and the commenters did not provide any, to suggest that manufacturers could cost effectively meet California evaporative standards on federal fuel with its higher RVP.

**COMMENT E:** EPA should accept the results from the California evaporative test, using CA certification test fuel, as evidence of compliance with the federal evaporative standard. (**Alliance of Automobile Manufacturers (IV-D-115), p. 134-135, California Air Resources Board (IV-D-271), p. 4**)

**RESPONSE:** In the NPRM, we explained that currently, with equal evaporative standards in California and the rest of the country, the federal test using higher RVP fuel is seen as "worst case" and California accepts test data from the federal test to indicate compliance with California evaporative standards. We asked for comment as to whether

we should accept data indicating compliance with California's LEVII evaporative standards to demonstrate compliance with Federal evaporative standards under Tier 2 since California's LEV II evaporative standards will be considerably more stringent than the standards we proposed and are finalizing..

Commenters argued that we should accept California test results but provided no data to compare testing under California fuel and conditions with testing under Federal fuel and conditions. The Alliance indicated it is willing to provide relevant information to EPA at a later time. With no data presently in our hands it is difficult to say that we should accept California data, but given the differences between the Cal LEV II and Tier 2 evaporative standards, it seems likely that a vehicle certified to California standards and conditions would also pass the Federal standards and conditions. We do not want to foreclose an opportunity for manufacturers to reduce workload and consequently, we are including a provision in the final rule that a manufacturer may demonstrate compliance with the federal evaporative standards using test data from other sources, including California certification, provided that the use of that test data has been approved in advance by EPA. Manufacturers must understand though, that they will be responsible for in-use evaporative performance as determined on federal fuel under federal test conditions.

## ISSUE 11: OTHER VEHICLE COMMENTS

**COMMENT A.1:** One commenter stated that EPA should ensure that the Tier 2 program fosters the development and utilization of advanced technology/electric vehicles. The commenter cautioned, however, that, although EPA should continue to provide new opportunities to incorporate cleaner fuels and vehicle technology into the Tier 2 and gasoline sulfur programs, research on these technologies should not be used to delay implementation of the programs. **(Ozone Transport Commission (IV-D-112), P. 1) (See other letters listed under Comments A.2, A.3 and B that follow.)**

**RESPONSE:** We have no intention to delay the implementation of the Tier 2 program while we wait for new technologies. We believe technologies are available now to meet the Tier 2 standards. Our proposal aligns, to the greatest extent possible, advanced vehicle technologies with low sulfur fuel. While the lead time we are offering to the manufacturers appears long to some commenters, we do not believe it is excessive. Appropriate leadtime is necessary to get low sulfur gasoline and diesel fuel production on track and to enable manufacturers to efficiently match emission control improvements with model changeovers. In the case of the HLDTs, we believe the leadtime is appropriate to afford manufacturers the opportunity, as they have historically had, to start production of Tier 2 technology vehicles on a smaller scale for California before having to go nationwide. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

Note that in the final rule, we are including a new provision that will provide additional NO<sub>x</sub> credits to manufacturers that certify vehicles to the lowest two bins during the early years of the program. See the preamble for more details.

**COMMENTS A.2 - .3, and B:** Numerous commenters stated generally that EPA should ensure that the Tier 2 program fosters the development and utilization of advanced technology/electric vehicles. One group recommended that Tier 2 should include an advanced technology vehicle sales requirement. In certain cases, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was over 2,100. **(20/20 Vision (IV-F-38), Alliance of Automobile Manufacturers (IV-F-76), Alliance of Automobile Manufacturers (Atlanta) (IV-F-132), American Lung Association (Philadelphia - Day 2) (IV-F-131), American Lung Association (Atlanta) (IV-F-132), American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of New Jersey (IV-D-211), American Lung Association of Ohio (IV-F-65), American Lung Association, et. al. (IV-D-98), BP Amoco (IV-F-74), Cascade Columbian Alliance (IV-D-276), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Climate Solutions (IV-D-279), Cornicelli, David (Cleveland) (IV-F-134), Earth Day Coalition (IV-F-82), Environmental Health Watch (IV-F-81), Fletcher, Robert E. (Atlanta) (IV-F-132), Fullam, Mary Jane (Philadelphia - Day 1) (IV-F-131), GA House of Representatives (Atlanta) (IV-F-132), General Motors (Philadelphia - Day 1) (IV-F-131), Greater Philadelphia Clean Cities Program (IV-F-129), Gutierrez, R. (IV-D-55), Kauffman, W. (IV-D-212), Lancaster Greens (IV-F-29), Lancaster Greens (Philadelphia - Day 2) (IV-F-131), Miller, J.C. (IV-F-71), Montgomery Intercounty Connector Coalition, Inc. (IV-D-41), Montgomery Intercounty Connector Coalition, Inc. (Philadelphia - Day 1) (IV-F-131), Ohio Lung Association (Cleveland) (IV-F-134), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Phan, Kimmy (Atlanta) (IV-F-132), Ray, C. (IV-F-101), Rollins, Rebecca (Cleveland) (IV-F-134), Rovito, S.**

**(IV-F-68), STAPPA/ALAPCO (IV-D-67), att. 2, p. 2, STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Sierra Club (IV-D-46), Sierra Club, Maryland Chapter (IV-F-52), Sierra Club, Maryland Chapter (IV-F-53), Sierra Club, Pennsylvania Chapter (IV-F-37), Township of Springfield (IV-D-105), Waring, George (Atlanta) (IV-F-132))**

EPA should actively encourage the development of innovative technologies that would help reduce emissions. **(American Lung Association, et. al. (IV-D-98), Multiple Private Citizens (IV-D-1, 2, 6, 7, 9, 12, 15, 16, 22, 27, 29-31, 33, 144, 145, 160, 161, 172, 184, 230, 247, 248, 263, and 267-269), Sierra Club - Northeastern OH (Cleveland) (IV-F-134), State PIRG Petitions (IV-D-241 and 249), Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), Voicemail Transcript Reports (IV-D-34, 35, 235, and 238))**

**RESPONSE:** We have established our bin structure and our averaging requirement to encourage the development and pull-ahead of advanced technology. Compared to California, our structure contains additional bins. We believe that by providing bins above the average NO<sub>x</sub> standard of 0.07 we create opportunities for manufacturers to retain some older or not-so-new technology vehicles provided they accept the challenge to produce vehicles certified to levels below 0.07. We have provided the 0.04 bin to provide a target for vehicles that can not yet reach 0.02 which they would have to do in California.

We did not propose or ask for comment on an advanced technology sales mandate and therefore can not finalize one, as one commenter suggests we should. However, we believe our program does provide incentives for advanced technology vehicles. We provide bins that afford ZEVs and hybrids the opportunity to offset the emissions of vehicles at higher bins. As described in our response to comment A. 1. above we have added a new provision to provide additional NO<sub>x</sub> credits for vehicles certified to the lowest two bins during the early years of our program. Also, our program provides opportunities for advanced high fuel economy technologies that may require slightly higher bins when they are first introduced. As we have said elsewhere in this document, our bin structure and program provide a way for advanced technology vehicles to get a foothold in the program, perhaps even at a higher bin, and then to reap benefits from higher levels of sales as they are refined and moved to lower bins.

**COMMENT C:** The Tier 2 proposal should not restrict States' rights under the CAA to adopt California's LEV program. **(American Lung Association of NY (Philadelphia - Day 1) (IV-F-131), American Lung Association of Queens, Inc. (IV-F-40))**

**RESPONSE:** Nothing in the Tier 2 proposal or final rule restricts, in any way, a state's right to adopt the California LEV program.

**COMMENT D:** EPA should ensure that the proposed program is consistent with the California LEV II program in terms of emission reductions and air quality benefits and/or should perform an in-depth comparison of both programs so that States will be able to make an informed choice between the two programs. **(American Lung Association of Georgia (IV-F-13), National Automobile Dealers Association (IV-D-129), p. 3, State of Connecticut, Dept. of Environmental Protection (IV-F-2))**

**RESPONSE:** Our modeling data and our models are publicly available. The Regulatory Impact Analysis for both the NPRM and the final rule contain considerable information

states can use in deciding which program best suits their needs. However, we do not believe any state will gain significant air quality benefits by adopting the California program. Our modeling indicates Tier 2 emission reductions exceed Cal LEV II emission reductions ( $\text{NO}_x + \text{VOC}$ ) for the important early years of the program.

**COMMENT E.1:** The Tier 2 program threatens to undercut the consistency that has been achieved between the NLEV and the California program; this will increase the compliance burden on manufacturers. The Tier 2 proposal creates a schedule for implementation of new requirements that is, in some respects, more aggressive than California's LEV II program. EPA has not provided an adequate explanation regarding why the standards, testing requirements, useful life requirements, evaporative systems and certification test fuels need to deviate from the California program. EPA should also take note of the requirement in section 244 of the CAA that it administer the Clean Fuel Program in the same fashion as California administers its corresponding standards. EPA does not adequately explain the costs and benefits of divergence and should eliminate or reduce the differences with the California program on the basis of the section 202(i) requirement to demonstrate cost-effectiveness. **(General Motors Corporation (IV-D-209), vol. 1, p. 4, 58-60) (See other letter listed under Comment E.2 that follows.)**

**RESPONSE:** Our NPRM included a number of provisions for the interim program that were more aggressive or otherwise different than California's LEV I program. To a large extent, we have rectified these in the final rule to aid carryover/carryacross of certification results between the two programs. For example, in the final rule, we are phasing in the 120,000 mile useful life requirement with the Tier 2 standards rather than applying it to all vehicles in 2004. Where some of our standards such as CO and formaldehyde were tighter than California's in some of the interim bins, we have aligned those standards. Where we proposed to require in-use testing on federal test fuel for the interim carryover vehicles, we have limited that to new certification and Tier 2 vehicles. Where we proposed intermediate and full life SFTP standards in addition to the 4000 mile SFTP standards that exist under NLEV, we have finalized a method which meets our statutory mandate for full life SFTP standards while minimizing the burden to the manufacturers.

Section 244 is not relevant to the Tier 2 standards. The directive in Section 244 that EPA administer and enforce the clean fuel vehicle standards in the same manner as CARB administers its LEV standards is expressly limited to the standards adopted for clean fuel vehicles under Sections 242 and 243, and does not extend to standards adopted under Section 202. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

**COMMENT E.2:** The Tier 2 proposal contains several references to the California LEV II standards but glosses over the conflicts between the California and national emissions control frameworks. EPA has failed to recognize that CARB refused to adopt important elements of the Tier II framework (such as different implementation schedules for passenger vehicles and larger light-duty trucks and the acceptability of diesel technology) and that these disparities in requirements will create significant compliance problems for industry. Given the inconsistencies between the LEV II and Tier 2 programs, particularly in light of the apparent infeasibility of the LEV II standards for diesel engine manufacturers, a denial of CARB's "waiver" for the LEV II standards is not only warranted but compelled under CAA Section 209(b). **(Navistar International**

**Transportation Corp. (IV-D-50), p. 25)**

**RESPONSE:** The commenter is attempting to use its Tier 2 comments as a forum to challenge California's waiver request for its LEV II program. The disposition of California's waiver request is beyond the scope of this rulemaking and the commenter should address its concerns about the waiver through the waiver process, not through this rulemaking.

**COMMENT F:** Mobile source toxics are a very significant contributor to overall toxics emissions and should be reduced as well. **(Environmental Defense Fund (IV-F-128), Environmental Health Watch (IV-F-81), NESCAUM (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** This rulemaking will lead to reductions in VOCs from exhaust and evaporative emissions, some of which are air toxics. Reductions in gasoline sulfur and NO<sub>x</sub> will reduce sulfate, nitrate and PM from these vehicles too. Section 202(l) of the Act requires EPA to perform a study of air toxics and establish regulations for the control of hazardous air pollutants or air toxics from motor vehicles if appropriate. We are under a court ordered deadline to issue a proposal to address these pollutants by April 28, 2000 and a final rule by December 22, 2000.

**COMMENTS G.1 - .2:** EPA should encourage the use of diesel engine technology since it has a great deal of benefits with respect to CO<sub>2</sub> reductions and fuel economy, and current technological developments in reducing emissions from diesel engines provide even greater benefits. Navistar states that it recently conducted a demonstration of passive trap technology using a school bus with a heavy duty diesel engines and ultra low sulfur diesel fuel. PM reductions of 90 percent were achieved - these reductions are 50 percent lower than the best 1998 certified CNG engine and the hydrocarbon emissions were lower than could be measured in certified test cells. In addition, there is no smoke or diesel odor associated with this demonstration. With tighter controls on NO<sub>x</sub> and PM emissions, Navistar's new generation of light-duty engines will provide an unsurpassed combination of environmental and performance benefits, including increased fuel economy, substantially reduced CO<sub>2</sub> emissions, greater engine durability and lower HC and CO emissions. Navistar provides significant discussion regarding the benefits of diesel engines and cites to the following as supporting documentation: National Research Council, Review of the Research Program of the Partnership for a New Generation of Vehicles, Fifth Report, 1999 (PNGV Report). **(Cummins Engine Company (Atlanta) (IV-F-132), Cummins Engine Company, Inc. (IV-F-32), Detroit Diesel Corporation (IV-D-52), p. 1-2, Detroit Diesel Corporation (Atlanta) (IV-F-132), Detroit Diesel Corporation (IV-F-92), Detroit Diesel Corporation (IV-F-96), Engine Manufacturers Association (IV-F-118), Engine Manufacturers Association (Atlanta) (IV-F-132), Navistar International Transportation Corporation (IV-F-12), Navistar International Transportation Corp. (IV-D-50), p. 5-7, Navistar International Transportation Corporation (Atlanta) (IV-F-132), Volkswagen of America, Inc. (IV-D-60), p. 4)**

**RESPONSE:** Our program is fuel neutral. With only a few exceptions, standards and program requirements are the same regardless of fuel. We believe that diesel vehicles will be able to meet the standards of our interim program with current fuels. We intend to propose a requirement for low sulfur diesel in the near future that would be in place by the time diesel LDV/LLDTs and HLDTs must meet Tier 2 standards. We do not believe

it is appropriate to promulgate less stringent standards for these engines to help in their development, given the substantial potential for a loss in emission reductions if such a path were taken.

**COMMENTS H and I:** Two commenters generally state that EPA should provide sufficient flexibility for manufacturers to help ensure vehicle and powertrain availability. Two other commenters state that EPA should ensure that the new Tier 2 standards do not compromise the safety or limit the availability of HLDTs. **(Colorado Automobile Dealers Assoc./National Automobile Dealers Assoc. (IV-F-123), Media Camping Center (IV-F-43), Pennsylvania Automotive Association (Philadelphia - Day 1) (IV-F-131), Pennsylvania Coalition for Vehicle Choice (IV-F-46))**

**RESPONSE:** We note that many vehicles of all light duty categories, come very close to meeting the Tier 2 standards today. As we indicated above, we believe that diesel vehicles will be available under both the interim and Tier 2 programs. As we note in the preamble and RIA, we do not believe the incremental costs to comply with Tier 2 standards will be large for any category of vehicle, consequently we see no impact of the interim or Tier 2 programs on model availability. As for safety, considering the technologies likely to be used to meet the standards, we have no reason to expect any impact on the safety of the vehicles. Nor do we know of any interactions between the technologies and the vehicles that might impact vehicle safety. None were raised to us by either comments in the interagency review process or in the public comment period. As we do not expect model availability to be impacted we do not believe the interim or Tier 2 program will contribute to misapplication of vehicles.

**COMMENT J:** EPA should do more to emphasize the progress that has already been made in reducing emissions from both cars and light trucks. **(Georgia Coalition for Vehicle Choice (IV-F-34), Ohio Coalition for Vehicle Choice (Cleveland) (IV-F-134), Pennsylvania Coalition for Vehicle Choice (IV-F-46))**

**RESPONSE:** We currently place extensive emission test data on our web site (EPA.GOV/OMS). This includes emission certification data as well as in-use testing data. In addition we also place fuel economy results on the web site and publish an annual fuel economy guide. Our web site contains numerous fact sheets reflecting how emission standards have changed over the years. Information on emission models and modeling can also be found there.

While we have made great progress in controlling emissions from motor vehicles, air quality and modeling data still show that many areas of the country need additional reductions and that reductions attributable to programs such as the NLEV program will not be sufficient in the face of increasing numbers of vehicles and increasing annual mileage of each vehicle.

**COMMENT K:** In the short term, EPA should incorporate an additional charge or "clean air contribution" (at the pump) for vehicles that have higher emission rates. **(Perry, Pamela (Atlanta) (IV-F-132))**

**RESPONSE:** This approach is beyond the scope of the proposal. Also the administrative burden for service station operators, fuel distributors, states and the



federal government of such a program would be quite large. In our final rule, we are proposing that all vehicles comply with the same emission standards, on average. Vehicles must be certified to a fairly narrow range of bins (from  $\text{NO}_x=0$  to 0.20) and if a manufacturer builds significant numbers of vehicles to the higher bins, it must offset them by successfully marketing vehicles certified to the lower bins. We believe this program will provide for appropriate flexibility for manufacturers, consumer choice of a wide range of vehicles, encouragement for the introduction of clean technologies, and substantial air quality benefits at a cost-effective price.

**COMMENT L:** EPA should consider a program that would continue to become more stringent over time. One commenter specifically suggests a declining  $\text{NO}_x$  average of 0.05 g/mile in 2009, and further  $\text{NO}_x$  reductions every two years after that time.

**(American Lung Association of Michigan (IV-F-94), International Center for Technology Assessment (IV-D-122), p. 6)**

**RESPONSE:** We are not adopting this comment. We believe that our Tier 2 rulemaking will lead to substantial, cost effective reductions in  $\text{NO}_x$  emissions. Our Tier 2 rulemaking does not constrain us from reducing  $\text{NO}_x$  emission standards further at some future date subject to relevant statutory requirements such as leadtime in the Clean Air Act.

**COMMENT M:** Supports EPA's proposal to exclude nonconformance penalties from the Tier 2 rulemaking. **(Alliance of Automobile Manufacturers (IV-D-115), p. 104)**

**RESPONSE:** Although we asked for comment on the use of NCPs, we did not propose them and are not finalizing them. As we stated in the preamble to the NPRM, NCPs have long been offered in our emission standards programs for heavy-duty engines, but have been virtually unused since the advent of averaging, banking and trading programs similar to the one contained in the Tier 2 rule. We believe manufacturers have little interest in making payments to the federal government when they have the option to apply those resources in such a way that they can benefit from emission gains gotten more cost effectively on some engines than on others and ultimately meet standards on average.

**COMMENT N.1:** EPA should ensure that information is available to the public that identifies the emission standard to which each vehicle is certified. EPA should devise a scheme similar to California's Smog Index, to be applied consistently nationwide. EPA should also initiate a public education campaign related to vehicle labeling. The Mobile Sources Technical Review Subcommittee (convened under the Federal Advisory Committee Act) has adopted a resolution making a similar recommendation. Commenters note that with such a plethora of vehicle types (cars and four categories of light trucks) and standards (7 bins, interim standards, etc.), labeling could be complex and very difficult for the public to understand. **(American Lung Association (IV-D-167), p. 10, American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Appalachian Mountain Club (IV-D-251), International Center for Technology Assessment (IV-D-122), p. 6, Maine Dept. of Environmental Protection (IV-D-177), Manufacturers of Emission Controls Association (IV-D-64), p. 4, Massachusetts Department of Environmental Protection (IV-D-137), p. 5, Ozone Transport Commission (IV-D-112), p. 3, SC Department of Health and Environmental Control (IV-D-56), p. 3, Physicians for Social**

**Responsibility (IV-D-194), p. 3, STAPPA/ALAPCO (IV-D-67), p. 12) (See other letter listed under Comment N.2 that follows.)**

**RESPONSE:** We will take this comment under advisement. Meanwhile, we will publish the certification data from all vehicles on an annual basis, as we have done for many years. An interested organization is welcome to rank vehicles and distribute appropriate data. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

**COMMENT N.2:** EPA should allow the Vehicle Information Control label to have a 9th character, enabling further harmony with the CARB coding system. This character would identify the emission standard to which the vehicle was certified. **(Alliance of Automobile Manufacturers (IV-D-115), p. 105)**

**RESPONSE:** This issue concerns a technical detail of certification procedures. This issue should be discussed with the vehicle certification team to determine whether it would be appropriate to handle this request without a regulatory change. If not, then this change should be considered in periodic technical amendments and revisions to the certification regulations.

**COMMENT O:** EPA committed reversible error in refusing to permit an adequate period of time for comment on the SNPRM. **(General Motors Corporation (IV-D-209), vol. 1, p. 64-65)**

**RESPONSE:** EPA disagrees with this comment. EPA provided 81 days following publication of the initial NPRM to comment on the NPRM. Following the publication of the NPRM, the D.C. Circuit issued its decision in the ATA case. EPA's supplemental notice merely provided EPA's discussion of how that decision affected the Tier 2 rule. EPA also provided new analyses of its modeling. This supplemental notice was signed on June 23, 1999. It was placed on EPA's Office of Mobile Sources web site the same day and a press release was issued on June 24, 1999. The supplemental notice was published in the Federal Register on June 30, 1999. This provided commenters with over a month to provide their comments on this supplemental notice. The commenter provides no explanation why the time period provided was not sufficient to respond to a relatively short supplemental notice. It must be remembered, in addition, that Congress required EPA to promulgate this rule by December 31, 1999, which created significant obstacles on EPA's ability to hold the comment period open longer than the time granted. Finally, EPA did reopen the comment period for thirty days on October 27, 1999, to take comment on issues raised in a second supplemental notice that were related to the issues discussed in the first supplemental notice.

**COMMENTS P and Q:** EPA should issue an annual report that details the performance of each manufacturer relative to the required standards. One commenter stresses that the records in Section 86.1862-04 must be publicly available and not subject to confidentiality claims. This commenter also stresses that monitoring compliance will be extremely complex, and these publicly available records and reports will be vital. One commenter states EPA should publish an annual report on compliance that identifies each manufacturer and lists the number of vehicles sold and in which bins they were located. **(American Lung Association (IV-D-167), p. 6, American Lung Association of**

**Gulfcoast Florida (IV-D-108), American Lung Association of New Jersey (IV-D-211), American Lung Association of Santa Clara-San Benito (IV-D-106), American Lung Association of South Dakota (IV-D-94), Children's Environmental Health Network (IV-D-205), SC Department of Health and Environmental Control (IV-D-56), p. 3, STAPPA/ALAPCO (IV-D-67), p. 7, Union of Concerned Scientists (IV-D-195), p. 13-14)**

**RESPONSE:** As we have indicated in other responses above, we routinely place our certification and in-use test data on our Web site. Any organization is free to analyze and distribute this data. With regard to the use of annual sales figures, manufacturers submit projected annual sales figures to EPA with their certification applications. However, such data is considered "business confidential" and is not releasable by EPA. At year end we may be able to release actual sales figures. We will take these comments under advisement as we begin to consider the nature of the data we are going to place on our Web site and the appropriate way to handle requests we may get for a manufacturer's credit balance and compliance status.

We do not believe that the burden related to monitoring each manufacturer's credit balances will be any different than what is posed now (for NMOG) under the NLEV program. We have been monitoring average emission results and the generation and usage of emission credits for approximately a decade under our heavy duty on-highway program. We also monitor credit generation and usage in some of our nonroad programs.

**COMMENT R:** To address concerns about the toxicity of diesel emissions and the potential increase in diesel vehicles, EPA should use its authority under Section 202(l)(2) as discussed in the National Air Toxics Program Integrated Urban Strategy.  
**(Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 2)**

**RESPONSE:** We have many programs in effect already that reduce air toxics including those from diesels. The Tier 2 rule will reduce air toxics because it will reduce hydrocarbon and particulate emissions from motor vehicles. Our diesel sulfur rule, for which an NPRM is expected in early 2000, would, if promulgated, reduce PM from all on-highway diesels. Our Tier 3 non-road diesel rulemaking will look at future reductions in non-road diesel emissions

Section 202(l) of the Clean Air Act requires EPA to perform a study and regulate air toxics if needed. Our forthcoming rulemaking under section 202(l) will assess the need for further controls from motor vehicles including diesels. We are subject to court ordered deadlines to issue a proposal by April 28, 2000 and a final rule by December 22, 2000.

**COMMENT S:** The Tier 2 rule should require that all new cars are clearly labeled with an easy to understand green rating system that takes into account all major pollutants, energy efficiency, durability of emissions controls, and full useful life warranty. In addition, EPA should create incentives for car makers to provide longer warranty periods.  
**(Maine Dept. of Environmental Protection (IV-D-177), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 5, NESCAUM (IV-D-130), p. 5-6)**

**RESPONSE:** We did not propose such a "green labeling" system in the NPRM. As indicated in numerous responses above, we place substantial emission and fuel

economy data on our Web site on a routine basis. Organizations may organize, analyze and disseminate that data in any legal manner. We have had suggestions about developing a rating system in the past. We believe that the development of such a system deserves consideration but would be better handled in a separate rulemaking so that all the issues involved can receive the appropriate review.

With regard to longer warranty periods, the commenter rightly notes that we are limited by the Clean Air Act and cannot mandate longer warranty periods. The commenter suggests that we should provide incentives to manufacturers to offer longer warranties. While we agree with the commenter's premise that longer warranties might induce manufacturers to produce more durable parts and configurations, the commenter provides no suggestions as to how we might provide such incentives. We agree with the commenter that car makers have greatly improved the emission durability of their vehicles over the last decade. We believe this trend may continue based on competition and normal market forces.

**COMMENT T:** Rules should be promulgated and available for SIP credit before states like Wisconsin have to submit 1-hour attainment SIPs. **(Wisconsin Transportation Builders Association (IV-D-185))**

**RESPONSE:** We are already in the process of addressing this issue. We agree it is important that states be able to incorporate the emission benefits of Tier 2 and sulfur controls as soon as possible.

**COMMENT U:** Encourages EPA to use in-use emission certification data to pursue remedial actions for vehicles that fail and to make the data public, including recall actions. **(Massachusetts Department of Environmental Protection (IV-D-137), p. 5)**

**RESPONSE:** The commenter is referring to in-use emission data collected under the CAP2000 program. We intend to closely monitor in-use testing data developed under the that program and to use that data as appropriate in our recall program. We currently place substantial information about motor vehicle recalls and the results of our in-use testing on our web site at [EPA.GOV/OMS/RECALL.HTM](http://EPA.GOV/OMS/RECALL.HTM).

## **PART B: GASOLINE SULFUR PROGRAM**

### **ISSUE 12: GENERAL COMMENTS - GASOLINE SULFUR**

#### **Issue 12.1: Supports Gasoline Proposal**

**COMMENTS A, B, D, E AND F:** Many commenters support the key parameters of the proposed, nationwide low-sulfur gasoline program. Many of these commenters urge EPA to reject oil industry measures that weaken or delay the proposal. In certain cases, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was over 80,000. A number of these commenters add that a low-sulfur program is one of the most effective solutions for reducing NO<sub>x</sub> emissions. One refiner supports generally the idea of the program, but argues that EPA must develop a program that recognizes that the transition on a national basis to lower sulfur gasoline will take time and require considerable upgrading of the U.S. refining system. The rule should encourage early action while still providing flexibility to facilitate the development and introduction of new technologies for further reducing vehicle emissions and fuel sulfur. One commenter states that low sulfur fuel is important to enable new clean car technologies, clean up wintertime "brown cloud" in Denver, reduce smog and exposure to toxics, cut haze, reduce acid deposition, and clean up harmful sooty particles. Finally, a State agency notes that the proposed sulfur control requirements satisfy both criteria in Section 211(c)(1) of the Act because the emissions generated by fuel sulfur endanger and actually damage public health and welfare, and because the sulfur levels impair vehicle emission control. **(Summary of Voice Mail and E-Mail Public Comments (IV-D-299) (Tabulation of EDF/Juno E-Mail Campaign), Alabama Dept. of Environmental Management (IV-D-201), American Lung Association (IV-D-167), p. 10, American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Philadelphia - Day 2) (IV-F-131), American Lung Association (Denver) (IV-F-133), American Lung Association of Colorado (Denver) (IV-F-133), American Lung Association of Gulfcoast Florida (IV-D-108), American Lung Association of NY (Philadelphia - Day 1) (IV-F-131), American Lung Association of New Jersey (IV-D-211), American Lung Association of Northern Ohio (IV-F-110), American Lung Association of Queens, Inc. (IV-F-40), American Lung Association of Santa Clara-San Benito (IV-D-106), American Lung Association of Virginia (IV-D-153), American Lung Association, et. al. (IV-D-98), American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Appalachian Mountain Club (IV-D-251), Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 3-4, BP Amoco (IV-D-58), p. 1, Below, C. C. (NH State Senator) (IV-D-165), Blackbrook Audubon Society (IV-F-104), California Air Resources Board (IV-D-271), p. 1, California Air Resources Board (IV-F-126), Campaign on Auto Pollution (IV-F-44), Chicago Dept. of the Environment (IV-D-200), Children's Environmental Health Network (IV-D-205), City of Arlington (IV-D-204), City of Bedford (IV-D-207), City of Boulder (IV-F-85), City of Cedar Hill (IV-D-221), City of Euless (IV-D-104), City of Fort Collins (IV-F-125), City of Frisco (IV-D-89), City of Glenn Heights (IV-D-280), City of Hurst (IV-D-141), City of Jacksonville, Regulatory & Environmental Services Dept. (IV-F-1), City of Kennedale (IV-D-222), City of Lewisville (IV-D-282), City of Mesquite (IV-D-281), City of Plano (IV-D-170), City of Richardson (IV-D-220), City of Richland Hills (IV-D-223), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Climate Solutions (IV-D-279), Cohen, B. J. (NH State Senator) (IV-D-198), Colorado Automobile Dealers Assoc./National Automobile Dealers Assoc. (IV-F-123), Colorado Environmental Coalition (IV-F-87),**

Colorado Public Interest Group (Denver) (IV-F-133), Council of State Governments, Eastern Regional Conference (IV-D-186), County of Dallas (IV-D-224), Department of Environmental Health, City and County of Denver (IV-F-62), Earth Day Coalition (IV-F-82), EcoCity Cleveland (IV-F-84), Environment Canada (Minister of the Environment) (IV-D-48), Environmental Defense Fund (IV-F-128), Erin Kelly (Denver) (IV-F-133), Evangelical Environmental Network (IV-F-22), Frumpkin, Howard (Atlanta) (IV-F-132), Ft. McDowell Yavapai Reservation (IV-D-250), Galik, D.S. (IV-F-79), Georgia Department of Natural Resources (IV-D-180), Glassroth, J., et. al. [587 individuals] (IV-D-227), Hester, Randy (Philadelphia - Day 1) (IV-F-131), Illinois Environmental Protection Agency (IV-D-133), International Center for Technology Assessment (IV-D-122), p. 2, International Center for Technology Assessment (IV-D-182), Kauffman, W. (IV-D-212), Kitzhaber, J. A. (Gov. of Oregon) (IV-D-44), Kondas, L. (IV-F-66), Lancaster Greens (IV-F-29), League of Women Voters (IV-D-213), League of Women Voters (Philadelphia - Day 2) (IV-F-131), League of Women Voters - La Grange Area (IL) (IV-D-169), League of Women Voters of Maryland (IV-D-274), League of Women Voters of West Virginia (IV-D-275), Levy, Robin (Atlanta) (IV-F-132), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), MI Environmental Council (Cleveland) (IV-F-134), Maine Dept. of Environmental Protection (IV-D-177), Manatee County Government (IV-D-45), Manufacturers of Emission Controls Association (IV-F-39), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 1, 3, 7, Metro Washington Air Quality Committee (IV-D-79), Michigan Environment Council (IV-F-105), Miller, C.R. (IV-F-63), Mitchell, B. L. (ME State Senator) (IV-D-96), Mitsubishi Motors R&D of America, Inc. (IV-D-127), Montgomery Intercounty Connector Coalition, Inc. (IV-D-41), Multiple Private Citizens (IV-D-1, 2, 6, 7, 9, 12, 15, 16, 22-28, 30, 31, 33, 144, 145, 160, 161, 172, 184, 230, 247, 248, 263, and 267-269), NAACP (Atlanta) (IV-F-132), NC Dept. of Environment and Natural Resources (IV-D-262), NESCAUM (Philadelphia - Day 1) (IV-F-131), National Conference of State Legislatures (IV-D-214), National Park Service (IV-D-135), New Hampshire Dept. of Environmental Services (IV-D-163), New Jersey Dept. of Environmental Protection (Philadelphia - Day 1) (IV-F-131), New Jersey Environmental Lobby (IV-D-261), New York Dept. of Environmental Conservation (IV-D-43), Nissan North America, Inc. (IV-D-125), p. 2, North Central Texas Council of Governments (IV-D-90), NESCAUM (IV-D-130), p. 1, Office of the Mayor of Saginaw (IV-D-78), Ohio Environmental Council (Cleveland) (IV-F-134), Ohio Local Air Pollution Control Officials Association (IV-F-97), Ohio Lung Association (Cleveland) (IV-F-134), Oregon Department of Environmental Quality (IV-F-57), Oregon (Office of the Governor) (IV-D-27), Oregonians for Clean Air (IV-D-202), Ozone Transport Commission (IV-F-4), Ozone Transport Commission (IV-D-99), Ozone Transport Commission (IV-D-112), p. 1, Pennsylvania Automotive Association (Philadelphia - Day 1) (IV-F-131), Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 1, 3, Public Interest Law Center of Philadelphia (Philadelphia - Day 2) (IV-F-131), Puget Sound Air Pollution Control Agency (IV-D-138), Ray, C. (IV-F-101), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), Rooney, J. Astra (Philadelphia - Day 2) (IV-F-131), Russman, R. (NH State Senator) (IV-D-199), SC Coastal Conservation League (IV-D-260), Senate Hearing Materials (IV-D-228), NY DEC statement, p. 1-2; DaimlerChrysler statement, p. 1-2, Senate Hearing Materials (IV-D-229), NY DEC statement, p. 1-2, DaimlerChrysler statement, p. 1-2, Sen. Lieberman, p. 1, Sen. Moynihan, p. 1, STAPPA/ALAPCO (IV-D-67), p. 13, STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Scott, Kevin (Philadelphia - Day 1) (IV-F-131), Scott, Kevin (Philadelphia - Day 2) (IV-F-131), Sierra Club (IV-D-46), Sierra Club (IV-F-14), Sierra Club (IV-F-3), Sierra Club (Philadelphia - Day 1) (IV-F-131), Sierra Club (Philadelphia - Day 2) (IV-F-131), Sierra Club, Ohio Chapter Energy Committee

(IV-D-101), Sierra Club, Southwest Region (Denver) (IV-F-133), Sierra Club, Utah Chapter (IV-F-116), Smith, S. (IV-D-19), Spokane Tribal Natural Resources (IV-D-95), State of Connecticut, Dept. of Environmental Protection (IV-F-2), State of Missouri Dept. of Natural Resources (IV-D-192), State PIRG Petitions (IV-D-241 and 249), State of Wisconsin (IV-D-166), Strauss, Sharon (Philadelphia - Day 1) (IV-F-131), Sunday, D. (IV-F-108), Tarrant County Commissioners Court (IV-D-219), Texas Natural Resource Conservation Commission (IV-D-232), The Hopi Tribe (IV-D-88), Tosco Corp. (IV-D-111), p. 1-2, Tosco Refining Company (IV-F-56), Town of Flower Mound (IV-D-173), Township of Springfield (IV-D-105), (Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Cleveland) (IV-F-134), Udall, M. (U.S. Rep.) (IV-D-210), Union of Concerned Scientists (IV-D-195), p. 1, Union of Concerned Scientists (IV-F-88), United Automobile Workers, International Union (IV-D-93), Voicemail Transcript Reports (IV-D-34, 35, 235, 237, and 238), Washington State Dept. of Ecology (IV-D-175), Wisconsin Transportation Builders Association (IV-D-185))

**RESPONSE:** Generally, these comments provide added justification and support for our program. EPA agrees that the sulfur program is one of most effective solutions for reducing NO<sub>x</sub> emissions and achieving additional environmental benefits mentioned by commenters. In addition, EPA agrees with the commenters who supported EPA's conclusion that gasoline sulfur significantly impairs vehicle emissions control systems. For these reasons, EPA is finalizing a strong program that achieves significant environmental benefits. As explained in the preamble and in responses to later comments (most notably Issues 13-16 below), as well as in the RIA, we have made some changes from the proposal to ensure a viable program that the refining industry can meet without excessive costs or supply shortfalls. We believe the final program does encourage early sulfur reduction through the ABT program, and provides sufficient flexibility for the development and implementation of improved desulfurization technologies.

**COMMENT C:** EPA should consider requiring reductions in sulfur without the Tier 2 vehicle standards, as this approach would be able to reduce emissions from the current fleet and would be much more cost-effective. **(General Motors Corporation (IV-D-209), vol. 2, p. 17-18)**

**RESPONSE:** As explained in the preamble, we have concluded, as we did in the proposal, that the emissions reductions needed from light-duty cars and trucks to improve our nation's air quality cannot be achieved without both Tier 2 emission standards and the gasoline sulfur control that enables these technologies. The existing fleet of vehicles will also benefit from gasoline sulfur control, and in the early years of the program, as Tier 2 vehicles are just phasing in to the fleet, the majority of benefits come from the emissions reductions in the existing fleet. However, over time these reductions would be outstripped by increases in the number of vehicles on the road and the number of vehicle-miles traveled if the emission control technology was not further improved. Hence, we need both gasoline sulfur control and Tier 2 standards. See our response to Issue 24.2(E) for additional discussion of this issue.

## Issue 12.2: Opposes Gasoline Proposal

***[Note: Only representative general opposition statements from refinery interests are included here; most opposition comments are summarized under the applicable specific issues (Issues 13-22).]***

**COMMENT A:** The low-sulfur proposal must be revised because it attempts to reduce sulfur levels too far, too fast. The proposal will result in fewer refineries, less certainty of supply, and higher costs to consumers. Some of these commenters suggest instead that EPA adopt the API/NPRA proposal. One commenter includes an overview of the key elements and advantages of that proposal. Two commenters add that for independent marketers, it is critical that small refiners remain viable. Based on CA experience, clearly many small refiners will cease gasoline production. This will restrict sources of supply, harm competition, and harm the ability of independent marketers to obtain fuel supplies at competitive rates. **(Ergon, Inc. (IV-D-157), p. 3-4, Independent Fuel Terminal Operators Association (IV-D-158), p. 1, Marathon Ashland Petroleum, LLC (IV-D-81), p. 2-4, National Petrochemical and Refiners Association (IV-F-19), National Petrochemical and Refiners Association (IV-D-118), p. 3-10, Senate Hearing Materials (IV-D-229), Marathon statement, p. 1, Society of Independent Gasoline Marketers of America (IV-D-156), p. 3)**

**RESPONSE:** We have considered these comments and have revised the program from the proposal to address some of these concerns. We believe the final program represents an orderly transition to low sulfur gasoline, so that installation of desulfurization equipment by refineries will be spread out over a number of years. The specific changes we have made that address these concerns include the geographic phase-in of our standards, modifications to the timing of the refinery average standard, the ABT program, and the use of allotments for compliance with the corporate pool average standard. In addition, we believe our small refiner provisions will minimize the likelihood that any refineries owned by small businesses would close or cease gasoline productions, by providing additional time to comply to those refiners that need it, so the concerns of independent marketers regarding the viability of small refiners should be addressed by our program. While the final rule does not adopt the API/NPRA proposal, we believe our program achieves the intended environmental goals through a reasonable transition to low sulfur gasoline. Our responses to some of the specific issues raised by the API/NPRA proposal are found in Issue 13 below.

**COMMENT B:** The low-sulfur fuel proposal will have a devastating impact on independent gasoline marketers in many areas of the nation. **(Society of Independent Gasoline Marketers of America (IV-F-61))**

**RESPONSE:** The commenter did not provide data to justify this claim. Except for the downstream standards, gasoline refiners, not marketers, are the regulated parties in this program. Since all refineries will have to comply with these requirements, all marketers will receive gasoline of the same quality (within the limits allowed under the program). Furthermore, since we have designed our program to facilitate a smooth transition to the new standards by all refiners, supply will not be adversely affected by these requirements. As described above, to the extent the independent marketers are concerned about the impact of our program on small refineries ultimately affecting the marketers, the small refiner provisions we have adopted address these concerns.



**COMMENT C:** The low-sulfur fuel program is too lenient. EPA should impose lower sulfur sooner than proposed. **(Alliance of Automobile Manufacturers (IV-F-858), DaimlerChrysler (Mobile Emissions) (IV-F-36), General Motors Corp. (IV-F-136)**

**RESPONSE:** As we explain further in our response to Issue 16, we concluded it is not feasible to accelerate the low sulfur requirement earlier than the time line adopted today. However, our sulfur averaging, banking, and trading program is intended to encourage and reward early reductions in sulfur levels. We believe sulfur levels will begin declining as soon as 2000 as some refiners take advantage of the sulfur ABT program. We address the commenters' recommendation that sulfur levels be required to be reduced below the 30 ppm refinery average level in our responses to Issue 14 below.

**COMMENT D:** Cannot support the proposal because it is not based on sound science, and it attempts to provide national solutions to localized problems. **(American Petroleum Institute (IV-D-114), p. 4-6, Davenport, G. R. (SC State Rep.) (IV-D-85), Ultramar Diamond Shamrock Corporation (IV-F-115))**

**RESPONSE:** We disagree that this proposal is not based on sound science. Our justification for the proposal is presented in the preamble and Regulatory Impact Analysis. More detailed responses to specific comments about our analysis of the technology that will be used by refineries and of the evaluation of the air quality benefits of this program can be found throughout this document. See Issue 13 for our responses to the concerns about a national program.

### **ISSUE 13: REGIONAL VS. NATIONAL PROGRAM**

**COMMENTS A - C, G, H, and K - M:** Many commenters support a national standard for low-sulfur gasoline. Many commenters note that implementing a program that would allow for higher gasoline sulfur levels in select states or regions would poison the catalyst on new Tier 2 vehicles and/or would negate much of the air quality benefits that can be achieved nationwide. National sulfur averages and caps are necessary to enable Tier 2 emissions technologies to work efficiently.

One commenter adds that dealers have made a large investment in tools, training, and parts to service vehicles with on-board diagnostics and advanced emissions control technologies. A regional gasoline sulfur program would undermine the public acceptance of on-board diagnostics as well as the entire Tier 2 program because fuel quality would not be consistent with what will be needed to effectuate emissions control. Another commenter supports a national standard for low-sulfur gasoline because dealers will avoid the burden of having to ensure that the vehicles that they're offering for sale can be used with higher sulfur gasoline.

The Alliance states that vehicles exposed to higher sulfur levels in the west may experience difficulty meeting in-use standards over time. Sulfur will also reduce the durability of these vehicles, potentially requiring premature replacement of catalysts. Sulfur's effect on modern three-way catalysts is incompletely reversible. The previous generation of emission control systems studied by the Auto/Oil Air Quality Improvement Research Program (AQIRP) (1986-1994 vintage, or Tier 0 and Tier 1) did show some signs of reversibility. However, these studies have been supplanted by more recent research (Letter from Alan E. Zengel, CRC, ref. CRC Project No. E-42, dated 12/22/97). Tests on LEV technology systems by the CRC demonstrate that as emissions standards become more stringent, the vehicle's sensitivity to sulfur increases and the potential for reversibility is diminished. For catalysts that are capable of meeting Cal LEV and NLEV standards, the effect is irreversible even under extremely aggressive driving patterns. AAM also cites to studies and data from DaimlerChrysler and Mercedes Benz as supporting documentation.

An oil company notes that given the issues beyond ozone nonattainment (regional haze, global climate, PM2.5, etc.), a regional approach is probably inappropriate. Commenter also notes that even though about one-half of its production is delivered to the Western market, the needs of western vehicle owners is such that a national standard should apply.

Another commenter adds that a Western or other geographic-based variance would contravene EPA's regulatory authority under section 211(c) of the CAA. The statute does not provide for geographic distinctions but turns on whether the emission control system will be "in general use." In addition, EPA's determination that high sulfur gasoline impairs motor vehicle catalysts is incompatible with a decision to allow high sulfur in the western U.S.

Several commenters add that Western air quality warrants the protection afforded by low sulfur fuel because it faces the same problems as elsewhere in the country. Reducing the sulfur in fuel will provide air quality benefits in the West consistent with the rationale behind the PSD program.

Regarding a regional approach, some argue that EPA should consider the

recommendations of the Western Regional Air Partnership before developing a final rule. Commenters attach/refer to correspondence from Western governors that documents strong concern in the region. However, another commenter notes that if EPA decides to use a dual sulfur standard, EPA must address infrastructure and other problems of having a strict dividing line (such as the Mississippi). A state agency argues that low sulfur fuels should be distributed nationally. However, in order to expedite emission reductions, EPA should consider a phased in approach that would require low-sulfur fuels in the areas of the country that currently are in nonattainment for the 1-hour and/or 8-hour standard.

Three commenters that support a clear national standard provide further support for their position. One states that if sulfur rules are deemed appropriate in the context of Tier 2 vehicles and emissions systems, it is absolutely essential that EPA not repeat its past mistaken policies of allowing -- and too often encouraging -- an ever-widening collection of gasoline standards. Fungibility and uniformity of standards help to enhance market liquidity, which has suffered significantly in the past because of the vagaries of environmental regulatory changes. Sudden and unpredictable changes produce aberrations that cause hardship to commodities markets, their petroleum industry customers, and gasoline consumers. The second argues that the division of the country into multiple gasoline sulfur level regions would add significant additional burdens for gasoline importers and blenders and make it more difficult for them to act in their traditional role of providing competitively priced gasoline to the U.S. market. Regional standards also would tax the gasoline storage and distribution system, which already is severely strained by the highly complex system of environmental requirements for gasoline and distillate fuel oils. The third states that Congress adopted preventive, low triggering thresholds for regulation of fuels which EPA must apply. Under these standards, a regional approach is unsupportable on the basis of air quality impacts and impacts on emission control equipment. EPA must err on the side of precaution in determining whether the emission product of a fuel or fuel additive contributes to air pollution which may reasonably be anticipated to endanger public health or welfare, and EPA's evaluation does not depend on the presence of a NAAQS. EPA need only determine that sulfur in gasoline will impair the performance of the new clean air technology "to a significant degree."

In contrast, a number of commenters urge EPA to consider and/or adopt the API/NPRA regional proposal.

**Commenters: 20/20 Vision (IV-F-38), 20/20 Vision (Denver) (IV-F-133), Albo, D. (VA State Delegate) (IV-D-197), Alliance of Automobile Manufacturers (IV-D-115), p. 136-139, Alliance of Automobile Manufacturers (IV-F-76), Alliance of Automobile Manufacturers (Atlanta) (IV-F-132), Alliance of Automobile Manufacturers (Denver) (IV-F-133), Alliance of Automobile Manufacturers (Cleveland) (IV-F-134), American Honda Motor Co. (IV-F-48), American Lung Association (IV-D-167), p. 10-11, American Lung Association (Atlanta) (IV-F-132), American Lung Association of Georgia (IV-F-13), American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of Northern Ohio (IV-F-110), American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), BP Amoco (IV-F-74), Bell, S. (IV-F-89), California Air Resources Board (IV-F-126), Campaign on Auto Pollution (IV-F-44), Chicago Dept. of the Environment (IV-D-200), Clean Air Council (IV-F-28), Colorado Automobile Dealers Assoc./National Automobile Dealers Assoc. (IV-F-123), Colorado Environmental Coalition (IV-F-87), Colorado Public Interest Group (Denver) (IV-F-133), Creech, B. (NC State Rep.) (IV-D-188), DaimlerChrysler (IV-D-59), p. 3, DaimlerChrysler (Mobile Emissions) (IV-F-36),**

DaimlerChrysler Corporation (Philadelphia - Day 2) (IV-F-131), DaimlerChrysler Corporation (Vehicle Emissions Planning) (IV-F-35), DaimlerChrysler statement, p. 2, National Park Service (IV-D-135), Detroit Diesel Corporation (IV-D-52), p. 3, Engine Manufacturers Association (IV-D-71), p. 13-14, Englebrecht, Erin (Atlanta) (IV-F-132), Environmental Defense Fund (IV-F-128), Environmental Defense Fund (IV-D-174), p. 3-4, 7-10, Environmental Defense Fund (Denver) (IV-F-133), Evangelical Environmental Network (IV-F-22), Fletcher, Robert E. (Atlanta) (IV-F-132), Florida Department of Environmental Protection, Div. of Air Resource Management (IV-F-16), Fullam, Mary Jane (Philadelphia - Day 1) (IV-F-131), Fund for Public Interest Research (Atlanta) (IV-F-132), Gary-Williams Energy Corporation (IV-F-122), Group Against Smog and Pollution (IV-F-45), Gutierrez, R. (IV-D-55), Harris, E., (KY State Senator) (IV-D-189), International Center for Technology Assessment (IV-D-122), p. 2, Kitzhaber, J. A. (Gov. of Oregon) (IV-D-44), Kremer, R. (NE State Senator) (IV-D-196), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Maine Dept. of Environmental Protection (IV-D-177), Mason, P. (IV-F-70), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 6-7, Mitchell, F. (NC State Rep.) (IV-D-190), Montgomery Intercounty Connector Coalition, Inc. (Philadelphia - Day 1) (IV-F-131), Morris, A. (NC State Rep.) (IV-D-187), Mountcastle, Brooks (Philadelphia - Day 2) (IV-F-131), NE Ohio Impact Project (IV-F-80), NESCAUM (Philadelphia - Day 1) (IV-F-131), NJ Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), National Automobile Dealers Association (IV-D-129), p. 3, National Environmental Trust (IV-F-26), National Park Service (IV-D-135), National Park Service (IV-F-121), National Petrochemical and Refiners Association (IV-D-118), p. 13-14, New Jersey Dept. of Environmental Protection (Philadelphia - Day 1) (IV-F-131), New York Mercantile Exchange (IV-D-231), Nissan North America, Inc. (IV-D-125), p. 2, NESCAUM (IV-D-130), p. 4, Ohio Public Interest Research Group (IV-F-98), Oregon (Office of the Governor) (IV-D-27), Oregon Department of Environmental Quality (IV-D-291), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Pennsylvania Automotive Association (Philadelphia - Day 1) (IV-F-131), Pennsylvania Automotive Association (Philadelphia - Day 1) (IV-F-131), Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 3, Pete Maysmith (Denver) (IV-F-133), Phillips Petroleum Company (IV-D-82), p. 2, A4, Physicians for Social Responsibility (IV-D-194), p. 4, Puget Sound Air Pollution Control Agency (IV-D-138), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), SC Department of Health and Environmental Control (IV-D-56), p. 4, STAPPA/ALAPCO (IV-D-67), p. 13-14, STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Senate Hearing Materials (IV-D-228), NY DEC statement, p. 1-2, Senate Hearing Materials (IV-D-229), Sen. Lieberman, p. 2, Sierra Club (IV-F-14), Sierra Club (IV-F-3), Sierra Club (Philadelphia - Day 1) (IV-F-131), Sierra Club, Maryland Chapter (IV-F-52), Sierra Club, Maryland Chapter (IV-F-53), Sierra Club, Southwest Region (Denver) (IV-F-133), Sierra Club, Utah Chapter (IV-F-116), Sinclair Oil Corp. (IV-D-150), Spokane Tribal Natural Resources (IV-D-95), State of California Air Resources Board (IV-D-21), State of Connecticut, Dept. of Environmental Protection (IV-F-2), State of Wisconsin (IV-D-166), Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Thomas Questions, p. 1, Sun City Center Woman's Club (IV-D-297), Sunoco, Inc. (IV-D-73), p. 3, Sunoco, Inc. (Philadelphia - Day 1) (IV-F-131), Sutherland, Asbill, & Brennan LLP (IV-D-225), Texas Natural Resource Conservation Commission (IV-D-232), Tosco Corp. (IV-D-111), p. 1-2, U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (IV-F-55), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Cleveland) (IV-F-134), United Automobile Workers, International Union (IV-D-93),

**Volkswagen of America, Inc. (IV-D-60), Wardrup, L. (VA State Delegate) (IV-D-191), Washington State Dept. of Ecology (IV-D-175), White, Randall F. (IV-F-10), Williams Companies, Inc. (IV-D-53), p. 2**

**RESPONSE:** Consistent with our proposal, we continue to believe that a national gasoline sulfur program is appropriate. Our conclusions are based on a number of factors, including:

- Tier 2 vehicles, which will be sold nationwide, need low sulfur gasoline to maintain certified emissions levels,
- vehicles already in the fleet, particularly NLEV vehicles, will realize emissions reductions when operated on low sulfur gasoline,
- states need these emissions reductions to achieve their air quality goals for ozone and PM since light-duty vehicles will continue to be significant contributors to these air quality problems,
- many of the benefits to human health and the environment resulting from this action extend beyond regional limits and should not be realized by only a fraction of the U.S. population, and
- the costs of this program are reasonable, particularly when the benefits are considered.

We have finalized a program that phases down sulfur levels temporally and geographically. In developing this program, we believe we have addressed the concerns about the potential for refinery closures in some regions of the country. Our adoption of separate standards for refineries meeting our definition of small and our delay of the 30 ppm refinery average standard to 2005 are designed to provide refiners across the country more time to evaluate and install the improved, lower cost desulfurization technologies. Furthermore, we have adopted a geographic phase-in of the standards, which allows refiners providing gasoline to some Western states to delay for one year compliance with the final 30 ppm average/80 ppm cap standards. We believe that our program represents the fastest way to reduce sulfur levels nationwide while minimizing the likelihood of unreasonable costs, supply disruptions, and refinery closures. Furthermore, by allowing time for refiners to make decisions about the most cost-effective approaches and time for an orderly transition to low sulfur gasoline, we have ensured that refiners will have adequate time to address concerns about PSD and other emissions requirements that could be adversely impacted if they had to rush to select a control strategy.

While some of the comments suggested that having different standards for different refiners is inconsistent with our legal authority under Section 211(c), we disagree. Section 211(c) gives us broad authority to adopt fuel controls and prohibitions. As described in Appendix D of the RIA, we are regulating sulfur based on findings under Sections 211(c)(1)(A) and (c)(1)(B). We agree with the commenter that Tier 2 vehicle emission control technology will be significantly impacted by gasoline sulfur, and that such technology will be in general use beginning in 2004 under the Tier 2 standards. However, while Section 211(c) gives EPA discretion to adopt fuel controls and prohibitions, it does not mandate any particular timing, level, or scope of regulation. These factors are left to EPA's discretion to adopt reasonable regulatory provisions. EPA agrees that some Tier 2 vehicles will experience adverse impacts during the geographic phase-in program, but we believe those impacts are acceptable in these early years, in light of the limited number of Tier 2 vehicles in the fleet at that time and the overall benefits of the program. Moreover, the geographic phase-in program is

temporary, and does require some control of gasoline sulfur in the phase-in area during the interim years. Therefore, Tier 2 vehicles (and vehicles already on the road) will see some benefits even before the 30/80 ppm standards apply nationwide .

**COMMENT D:** Opposes a national standard for low-sulfur gasoline as unnecessary for clean air improvements and too costly. Suggests instead that EPA adopt the API/NPRA regional proposal. One of these commenters notes that the refining industry presented a good faith offer that represented significant controls but that EPA ignored this proposal and instead merely proposed a strategy consistent with the auto industry position. Rural states such as South Dakota depend heavily on gasoline, and gasoline price increases would cut significantly into the incomes of farmers that are already faced with declining incomes. If the rule forces small western refineries to close, the price impact will be even more severe. Since the need for the proposal is primarily in eastern populated regions, a regional approach is fairer. There are a number of reasons for adopting a regional standard. First, western states have good air quality with few ozone problems outside of CA. Second, the western governors have strongly urged the consideration of a regional approach (commenter attaches applicable correspondence). Third, rural states have a small vehicle inventory with emissions dispersed over a wide geographic area and therefore, the controls will have little or no impact in the western states. Fourth, rural populations will pay more for sulfur control due to high per capita gasoline usage rates. Fifth, the sulfur reduction compliance costs in PADD IV will be nearly twice as high as the national average, according to EPA's estimates. Sixth, nearly all of the PADD IV supply is from small refineries, and only some of those qualify for small refiner relief under the proposal. At the least, a national standard should be phased in at different times for different regions given that attainment and nonattainment areas do not need the same level of regulation at the same time. Commenter notes that regional strategies are common for air quality regulatory programs. OTAG, OTC, Grand Canyon Visibility Commission and WRAP are all examples of coalition efforts to address regional air quality issues. In addition, the NO<sub>x</sub> SIP Call, the NLEV program, and regional requirements for conventional versus reformulated gasoline are all examples of regulatory programs that vary on a regional basis. Given that most of the country is in or about to achieve attainment of the existing air quality standards, the benefits of a nationwide program are modest, but the costs are enormous. Most parts of the nation, including most areas west of the Mississippi, already enjoy good air quality. Elsewhere, especially in the Northeast, air quality is improving but still falls short of meeting federal standards. Imposing the same stringent sulfur reduction everywhere -- essentially requiring California-style sulfur levels from coast to coast -- means that millions of people would be paying for something that provides no significant benefit to them.

(American Petroleum Institute (IV-D-114), p. 22-23, American Petroleum Institute (Philadelphia - Day 1) (IV-F-131), Citgo Petroleum Corp. (IV-D-126), p. 1, Citgo Petroleum Corporation (IV-F-33), Conoco, Inc. (IV-F-120), Equiva Services LLC (IV-D-168), Ergon, Inc. (IV-D-157), p. 1, Frontier Oil (Denver) (IV-F-133), Giant Industries, Inc. (IV-D-66), p. 1-2, Giant Industries, Inc. (IV-D-92), p. 1-2, Kansas State Senate (IV-D-02), Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Marathon Ashland Petroleum LLC (IV-D-81), p. 2, Murphy Oil USA, Inc. (IV-D-117), p. 3, National Petrochemical and Refiners Association (IV-D-118), p. 9-10, National Petrochemical and Refiners Association (IV-F-19), Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 14-16), Sinclair Oil Corp. (IV-D-150), p. 1-3; Ex. 1, p. 4-5, Society of Independent Gasoline Marketers of America (IV-D-156), p. 4, SD Dept. of Environment and Natural Resources (IV-D-218), Senate Hearing Materials (IV-D-229), Sinclair Oil Corp.

**(IV-D-150), p. 2-3; Ex. 1, p. 4-5; Ex. 2, p. 3-4, 9; Ex.3, SD DENR statement, p. 1-3, Society of Independent Gasoline Marketers of America (IV-F-61))**

**RESPONSE:** Contrary to some of these comments, we have given full consideration to the proposal put forth by API/NPRA, as well as alternatives received from individual refining companies. Based on this information, we included the geographic phase-in of our sulfur standards to complement the other improvements we've made to our program. We disagree with API's recommendations regarding a permanent regional program, as well as with the sulfur levels they recommend. The sulfur levels in API's proposal are too high to achieve needed air quality benefits, and to avoid significant impairment to Tier 2 vehicle emissions control systems. Our rationale for the sulfur levels we are adopting is described in our responses under Issue 14. In addition, we have concluded that a permanent or long-term regional program will significantly impair the emissions control systems of Tier 2 vehicles that are sold in and that operate in the phase-in area, including irreversible effects for vehicles whose owners live in the Eastern U.S. and travel to the West and back, and will not provide the national air quality benefits we believe are the primary goal of the combined Tier 2/gasoline sulfur program. Western states and cities will benefit from the emission reductions enabled by reducing gasoline sulfur, including ozone benefits as well as PM and air toxics benefits. In addition, Eastern states will benefit from reductions in pollutants that can be transported from the West to the East, as well as from the avoidance of irreversible adverse effects on Tier 2 vehicles that are driven in the West. Our analysis shows that these benefits can be achieved at a reasonable cost, and our program allows for a reasonable phase-down of sulfur requirements that will help individual refiners and refineries meet the standards without incurring very high costs.

Our geographic phase-in program addresses some of the specific concerns raised by commenters. First, the phase-in program provides temporary, less stringent standards in some areas that have relatively less urgent air quality needs. Second, this approach addresses the concerns raised by Western governors by providing additional time for low sulfur gasoline to phase in in some Western states. Third, the phase-in will reduce the costs of the low sulfur program in the phase-in states, since the delayed implementation of the 30/80 ppm standards will make it more likely that refiners who supply that area will use newer, lower cost desulfurization technologies. Fourth, the phase-in will address the concerns raised about small volume refineries. For small volume refineries owned by small businesses, the interim standards described in Section IV.C.2 of the preamble provide flexibility to address their unique circumstances. For other small volume refineries, the geographic phase-in provisions provide similar flexibility by allowing more time to reach the ultimate low sulfur standard applicable nationwide. With our geographic phase-in, our small refiner standards, and our revisions to the sulfur ABT program, we no longer estimate the costs for refiners in western states to be significantly higher than costs borne by other refiners. Thus, consumers in the west will not be paying significantly more than citizens elsewhere in the country, although their per-capita costs may be slightly higher due to their greater fuel consumption.

**COMMENT E:** A regional approach should be implemented for reducing sulfur levels in gasoline as air quality problems vary dramatically across the nation. Commenter suggests that, given that there is no air quality justification for requiring low sulfur fuel in most western states, a regional phase-in program may be appropriate. The auto manufacturers have significant flexibility in meeting the Tier 2 standards and with fleet turnover, the need for low sulfur gasoline to enable new technology does not exist until

2006/07 and arguably 2008/09. Thus, EPA should consider a phase-in (without small refiner relief provisions) for western states until 2008/09. **(Albo, D. (VA State Delegate) (IV-D-197), Colorado Petroleum Association (Denver) (IV-F-133), Conoco, Inc. (IV-F-120), (Exxon Company, USA (IV-D-119), p. 4, Freeborn, J. L. (KS State Rep.) (IV-D-76), Grooms, L. K. (SC State Senator) (IV-D-84), Kremer, R. (NE State Senator) (IV-D-196), Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Senate Hearing Materials (IV-D-229), Marathon statement, p. 1, Sinclair Oil (Denver) (IV-F-133), Tesoro Northwest Company (IV-D-91), Ultramar Diamond Shamrock Corporation (IV-F-115), Ultramar Diamond Shamrock Corporation (IV-F-115), Wyoming Refining Company (IV-F-127))**

**RESPONSE:** As evidenced by our earlier responses, we disagree that there is no air quality justification for a national gasoline sulfur program. We have, however, concluded that a geographic phase-in as well as other temporal phase-ins are appropriate and necessary to allow the refining industry to lower sulfur levels nationwide without incurring unreasonable costs and exposing the U.S. gasoline market to supply disruptions. The first Tier 2 vehicles will be sold beginning with model year 2004 (if not earlier due to voluntary early introduction). These vehicles need the same protection from gasoline sulfur that vehicles sold in larger quantities later in the phase-in require. We are compromising to some extent the emissions performance of these earlier vehicles by allowing sulfur levels higher than 80 ppm in the years while the program is phasing-in (both temporally and geographically). However, if we had delayed the start of gasoline sulfur program until 2006 or later, as the comment suggests, a substantial fraction of Tier 2 vehicles would experience severely compromised emissions performance. Furthermore, the emissions reductions expected from the existing fleet in 2004 and 2005 would be lost; in these years, these reductions are significant.

**COMMENT F:** Refiners in idiosyncratic situations, such as those in Alaska, should not be subject to the same implementation timetable and should be able to seek an exemption. For instance, Alaska refinery construction schedules are significantly longer due to remote locations and weather constraints. **(Williams Companies, Inc. (IV-D-53), p. 2, (Williams Energy Services (IV-F-114))**

**RESPONSE:** Given our overall arguments for the need for national control, and since Tier 2 vehicles will be introduced in Alaska beginning in 2004, we cannot permit refineries in Alaska to be exempted from producing low sulfur gasoline. However, we have included Alaska in the area where refiners can opt into the geographic phase-in of the sulfur standards. This will allow interested refiners in Alaska an additional year - until 2007 - to meet the 30 ppm /80 ppm standards. We believe seven years is adequate time to provide for Alaskan refineries to comply with these standards.

**COMMENTS I and J:** Refinery interests argue that the low sulfur fuel requirement will cause the shutdown of one or more Western refineries, leading to supply problems. Commenter disputes the MathPro analysis, which used an average refinery concept to conclude that no refinery closures would occur in PADD IV. The refineries with refining margins below the "average" are very likely to close. Furthermore, the MathPro analysis assumes that all U.S. refineries pay national average prices for imported crude oil and transportation, and that each refinery in a PADD region pays the PADD-specific well head cost for domestic crude plus a national average delivery cost. These assumptions do not reflect reality. Another commenter also disputes the MathPro study because: (1) MathPro did a PADD IV report for the refining industry that showed compliance costs



twice as high as the study performed for the auto industry; (2) The MathPro finding that the proposal would reduce PADD IV refining capacity by 10% would significantly affect supply based on CA experience, contrary to MathPro's conclusions; (3) The MathPro study assumes the use of new, unproven desulfurization technologies, and commenter is unable to reconcile MathPro's assumed costs for these technologies with vendor estimates the refiner has received; and 4) The MathPro findings are directly contrary to the strong concerns raised by the PADD IV refiners, distributors, and Western governors. Commenter notes that it would be far more cost effective to address reversibility concerns through vehicle maintenance or catalyst replacement. Commenter includes data on catalyst replacement and notes that the effects of sulfur likely can be reversed through catalyst removal and placing it in an oven for less than an hour.

However, others argue that the low sulfur fuel requirement will not cause Western refineries to shut down and will not disrupt fuel supplies. Although the cost of desulfurizing fuel at refineries in the Rocky Mountain region of the country (PADD 4) would be somewhat higher than the rest of the country, a 30 ppm national sulfur standard is unlikely to lead to closures at these facilities. AAM cites to a recent study: MathPro, "Likely Effect on Gasoline Supply in PADD 4 of a National Standard for Gasoline Sulfur Content," dated 3/18/99 (item 3 -Appendix C of AAM letter).

**(Alliance of Automobile Manufacturers (IV-D-115), p. 125-26), (Environmental Defense Fund (Denver) (IV-F-133), Senate Hearing Materials (IV-D-229), SD DENR statement, p. 1-3, Sinclair Oil Corp. (IV-D-150), p. 2, Ex. 1, p. 5, Wyoming Refining Company (IV-D-148), p. 4-5; att. (all), Wyoming Refining Company (IV-F-127))**

**RESPONSE:** We have provided a range of flexibilities, from the geographic phase-in to the sulfur averaging, banking, and trading (ABT) program which allows many refineries to delay construction and the small refiner provisions which many Western refineries will be eligible for, which will help refiners avoid the decision to close a refinery. Furthermore, unlike our estimates in the proposed rule, our revised cost analysis no longer shows that refineries in this region will incur substantially higher costs than the average national refinery to comply with the requirements. Therefore, we believe our program is reasonable and will not introduce undue hardships to this region.

While we referred to a MathPro study in our proposal, the MathPro studies cited by some commenters did not form a substantial part of our justification for our final program, since we have revised our cost analysis since proposal. See chapter V.B of the RIA for a complete discussion of our gasoline sulfur cost analysis.

**COMMENT N:** EPA's national, one-size-fits-all approach is not balanced enough to achieve the necessary reductions in emissions at the lowest possible cost to the public. **(Conoco, Inc. (IV-F-120))**

**RESPONSE:** With the range of flexibilities and phase-ins we have adopted, we believe that our program is far from a "one-size-fits-all" approach. Refiners across the country of various sizes and capabilities will be able to meet our standards without unreasonable costs. The delays we have introduced will allow most refiners to adopt the lowest cost desulfurization technologies, benefitting the consumer. Ultimately, all of the public will benefit from the reduced emissions that this program will enable.

#### ISSUE 14: FINAL SULFUR LEVEL

**COMMENT A:** There is no evidence to support the need anywhere in the U.S. for a sulfur level as low as 30 ppm. Some of these commenters note that recent DOE analysis and EPA's own RIA cost analysis indicate that there is a significant increase in cost at the 30 to 40 ppm level. Because these analyses are simple and over optimized, it is likely that this cost phenomenon occurs at a somewhat higher sulfur level. This suggests that there may be a more reasonable cost effective level higher than 30 ppm. Another commenter suggests generally that there is no justification for the proposed 30 ppm level as opposed to 20, 40 or 80 ppm, and that EPA's cost analyses should consider other options that may be more cost effective. Two commenters suggest EPA reconsider the petroleum industry proposal. One of these commenters notes that because this plan was supported by both large and small refiners, the adoption of this approach would not face opposition from the refining industry and would not raise concerns about supply impacts and refinery closings. One commenter notes that, although a decrease to 80 ppm appears to have clear NO<sub>x</sub> reduction benefits, the benefits of reducing sulfur below that level are unclear. It appears that at sulfur levels below 80 ppm, the impact of sulfur on catalyst performance appears to be car model-specific, which suggests that vehicle and emission control engineering may be the appropriate solution. Also, the impact of sulfur on the catalyst under both start-up and steady state conditions should be considered. **(American Institute of Chemical Engineers (IV-D-242), Countrymark Cooperative, Inc. (IV-D-154), p. 4., Flying J Inc. (IV-D-151), p. 5-6, National Petrochemical and Refiners Association (IV-D-118), p. 2, 15, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 21, Sinclair Oil Corp. (IV-D-150), Ex. 1, p. 2-3; Ex. 2, p. 2-3, U.S. Chamber of Commerce (IV-D-142), Ultramar Diamond Shamrock Corporation (IV-F-115))**

**RESPONSE:** Since our justification for reducing gasoline sulfur, pursuant to our authority under § 211(c) of the Clean Air Act, is not only based on adverse public health and welfare effect of sulfur in gasoline, but also on the impacts on emission control technology, we are not required to identify a maximum cost-effectiveness or optimum incremental cost-effectiveness when selecting the final gasoline sulfur standards. As required by § 211(c), we have considered available economic data, discussed in detail in the RIA in this rulemaking. However, this provision of the Act does not require EPA to evaluate the cost-effectiveness of each and every possible sulfur level, once the Agency has made the threshold findings required by the statute in deciding to regulate sulfur in gasoline. See Amoco Oil Co. et al. v. EPA, 501 F.2d. 722, 735-36 (D.C. Cir., 1974).

With regard to the effect of sulfur in gasoline on vehicle emissions control systems, we conclude that the Tier 2 standards would not be met by vehicles in-use if these vehicles are not operated consistently on gasoline meeting the 30 ppm average/80 ppm cap standards. (At the same time, we do not believe that lower sulfur levels are necessary to enable vehicles to meet the Tier 2 standards, although their emissions performance would likely be helped by even lower levels. Our responses to comments recommending lower sulfur levels are addressed below.) With the 80 ppm cap, vehicles will be fueled with gasoline of varying sulfur levels, but we believe an average of 30 ppm is necessary to achieve the emissions reductions which we need from Tier 2 vehicles to meet the Agency's and States' air quality goals. (See our response to points 14(I) and (J) below for further justification for the 30/80 standards.) We believe the overall cost-effectiveness of the combination of Tier 2 standards and these gasoline sulfur standards is reasonable when compared to other options for getting similar reductions in VOC and NO<sub>x</sub>.

**COMMENTS B - H:** Two commenters state that the proposed standard is not feasible for most refiners, and another supports a nationwide 150 ppm sulfur pool average with a 300 ppm cap. However, many commenters support the 80 ppm cap and/or 30 ppm average for fuel sulfur, and several others argue that the sulfur standard should be lower than proposed. Lower sulfur levels would provide additional emissions benefits from both the existing and the future vehicle fleets because continuing to lower sulfur will reduce catalyst poisoning. Lower sulfur levels would support the development of advanced technology vehicles.

Auto interests and others support a near-zero sulfur standard as necessary to achieve the Tier 2 standards, a technologically feasible and affordable prospect. Alliance: EPA should impose a 30 ppm standard between 2004 and 2007 and a 5 ppm standard between 2008 and 2011. AAM discusses at length the history and success of the California program to reduce sulfur and its air quality achievements and includes additional data on low-sulfur fuels that have been achieved and maintained around the world. GM provides significant discussion regarding the need for reducing sulfur levels to below 5 ppm and the importance of low-sulfur for emerging technologies, including vehicles with SIDI engines, CIDI engines, fuel cells, and those that use alternative fuels. Sulfur levels at 5 ppm or below in both gasoline and diesel will contribute to a much higher level of emission reductions and will allow emerging emission reduction technologies to perform as designed. GM cites to a paper published by the Manufacturers of Emission Control Devices (MECA), dated April 1999 that documents the effects of fuel sulfur on a wide range of gasoline and diesel engine exhaust-treatment devices and concludes that sulfur should be reduced to substantially below 30 ppm to enable various technologies, such as lean NO<sub>x</sub> catalysts, NO<sub>x</sub> adsorber catalysts, and particulate filters. The fifth report from the National Research Council on the government and industry research PNGV program also recently concluded that near-zero sulfur fuels would be necessary.

One commenter supports 5 ppm sulfur in gasoline if it is accompanied by even tighter emissions standards than required under the current proposal. Such standards would be achievable only by use of advanced technologies that could not properly operate on 30 ppm gasoline. However, the record is clear that EPA's proposed standards, and even lower ones, can be met using 30 ppm gasoline.

A number of refinery interests oppose a near-zero sulfur level as proposed by the Alliance. The Alliance claims that near-zero sulfur gasoline will "double the benefits of the new emission standards." This is hard to believe. Since EPA claims that Tier 2 standards will result in .10781 tons of NO<sub>x</sub> and NMHC per vehicle, and the current NLEVs on today's gasoline have .20256 tons of NO<sub>x</sub> and NMHC per vehicle, a doubling of the benefit would result in a vehicle with negative emissions. Mobil has conducted a vehicle measurement program to evaluate the effect of reducing sulfur below 30 ppm that shows that only a small reduction in NO<sub>x</sub> can be expected from reducing average sulfur from 30 ppm to 5 ppm in low emission vehicles. The sulfur effects that have been proposed for MOBILE6 were used by EPA to estimate the benefit of the Tier 2 sulfur reduction. The MOBILE6 methodology overestimates the sulfur effects, particularly at low sulfur levels. This methodology cannot be used to estimate sulfur levels below 30 ppm. There is abundant evidence that significant efforts have been devoted to the development of after treatment devices that are tolerant of very low gasoline sulfur levels -- particularly since the time that the EPA first publicly initiated the congressionally-mandated Tier 2 a couple of years ago. Setting an ultra-low or near-zero

gasoline sulfur standard would provide a substantial disincentive to these promising research efforts.

Several of these commenters state that the information provided in the RIA (including separate studies by MECA, CARB, and EPA) clearly indicates that gasoline sulfur below 30 ppm is not needed to enable vehicle technology to meet the proposed Tier 2 standards. It is not needed to avoid significantly impairing emission control devices that are in general use or that will be in general use. Finally, the proposed Tier 2 vehicle certification standards provide considerable flexibility to auto manufacturers in timing and in fleet averaging that further mitigates need for near-zero sulfur gasoline. Some oil companies raise similar points and note that while they supports the treatment of the vehicle and fuel as a system, there is no need for ultra low sulfur fuel to support vehicles designed to achieve the Tier 2 standards. One of the refining commenters and an interest group commenter added that only if EPA wants to consider tighter vehicle controls should it consider ultra low sulfur levels.

Some of these refining interest commenters argue that ultra-low sulfur gasoline is not warranted because (1) it may not be used by new generations of vehicles; (2) its environmental benefits are unclear; and/or (3) it may threaten gasoline price and supply. One oil company provided an analysis to document that this ultra low sulfur level could result in supply reductions of 10-15% and cost increases of 10-15 cents/gallon. One commenter notes that it is unclear what technology would be used to get to this level and whether it would work properly; at the least, EPA needs to do a detailed cost-benefit analysis of this option. By definition, near zero sulfur levels require every gasoline blend stream to be treated. The sulfur levels of these blend streams vary on a day-to-day and hour-to-hour basis as crudes are changed and different units, such as cokers, go through their cycles. This variability makes it very difficult to target the lowest possible sulfur levels and to remain at that level consistently. NPRA provides further analysis of the fuel stocks to document that achieving near zero sulfur levels is questionable from a feasibility standpoint and highly questionable with respect to cost. This, coupled with measurement uncertainties, makes near zero sulfur levels difficult to attain according to refining industry commenters. MAP believes that near zero sulfur levels cannot be measured accurately using current techniques. For example, current ASTM D2622 method will not be adequate to measure the sulfur levels proposed in the Tier 2 rule. Another commenter argues that terminal operators would not have the necessary sophisticated testing equipment available, and, even then, would have to rely on a refiner's certification because of potential interference from residual gasoline in a line or tank.

Some commenters also note that a 5 ppm level would not be cost-effective. It would require increased severity of hydrotreating, would result in increased octane penalty, would require increased volume of materials to be treated, and would not provide adequate flexibility for turnarounds/upsets. It would also isolate the U.S. market from imports that could magnify supply concerns. The rule also already imposes more of the costs on the refining industry than the benefits associated with reduced sulfur levels, which argues against any increased refinery costs. Finally, one commenter adds that achieving 5 ppm is not possible using current technology and would be devastating to the refining industry.

**Commenters: American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (IV-D-167), p. 13, Appalachian Mountain Club (IV-D-251), Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 3-4, Association of**

International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), California Air Resources Board (IV-F-126), California Air Resources Board (IV-D-271), p. 4-5, Citgo Petroleum Corporation (IV-F-33), Countrymark Cooperative, Inc. (IV-F-124), General Motors Corp. (IV-F-136), International Center for Technology Assessment (IV-D-122), p. 8-10, League of Women Voters (IV-D-213), Maine Dept. of Environmental Protection (IV-D-177), Manufacturers of Emission Controls Association (IV-F-39), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 6, NESCAUM (IV-D-130), p. 4, Oregon (Office of the Governor) (IV-D-27), Puget Sound Air Pollution Control Agency (IV-D-138), STAPPA/ALAPCO (IV-D-67), p. 16, STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-6), State of Connecticut, Dept. of Environmental Protection (IV-F-2), State of Wisconsin (IV-D-166), Sunoco, Inc. (Philadelphia - Day 1) (IV-F-131), Union of Concerned Scientists (IV-F-88), Alliance of Automobile Manufacturers (IV-F-76), Alliance of Automobile Manufacturers (Atlanta) (IV-F-132), Alliance of Automobile Manufacturers (Denver) (IV-F-133), Alliance of Automobile Manufacturers (Cleveland) (IV-F-134), American Lung Association (Atlanta) (IV-F-132), Cummins Engine Company (Atlanta) (IV-F-132), Cummins Engine Company, Inc. (IV-F-32), DaimlerChrysler (IV-D-59), p. 4, DaimlerChrysler (Mobile Emissions) (IV-F-36), DaimlerChrysler Corporation (Vehicle Emissions Planning) (IV-F-35), Detroit Diesel Corporation (IV-F-92), Detroit Diesel Corporation (IV-F-96), Engine Manufacturers Association (IV-D-71), p. 6, 36, Ford Motor Company (Philadelphia - Day 1) (IV-F-131), Galik, D.S. (IV-F-79), General Motors (Philadelphia - Day 1) (IV-F-131), Manufacturers of Emission Controls Association (IV-D-64), p. 5, Mitsubishi Motors R&D of America, Inc. (IV-D-127), New Jersey Dept. of Environmental Protection (Philadelphia - Day 1) (IV-F-131), Nissan North America, Inc. (IV-D-125), p. 2-3, Tennessee Environmental Council (Atlanta) (IV-F-132), Toyota (IV-D-63), p. 2, United Automobile Workers, International Union (IV-D-93), Volkswagen of America, Inc. (IV-D-60), p. 2, Volkswagen of America, Inc. (IV-F-54), Alliance of Automobile Manufacturers (IV-D-115), p. 44, 106-110, 136-139, General Motors Corporation (IV-D-209), vol. 2, p. 14-18, American Petroleum Institute (IV-D-114), p. 110-111, 139-141, 150-151, Marathon Ashland Petroleum (IV-D-81), p. 13-14, 49-50, 69, Mobil Oil Corp. (IV-D-113), p. 5-10, 12-13, Exxon Company, USA (IV-D-119), p. 3-4, Independent Fuel Terminal Operators Association (IV-D-158), p. 5-7, Phillips Petroleum Company (IV-D-82), p. A3-A4, Koch Petroleum Group, LP (IV-D-72), p. 24-27, Marathon Ashland (Philadelphia - Day 1) (IV-F-131), National Petrochemical and Refiners Association (IV-D-118), p. 29-31, Pennzoil-Quaker State Co. (IV-D-128), p. 11-12, Sunoco, Inc. (IV-D-73), p. 28-29)

**RESPONSE:** Several commenters recommended adoption of a sulfur standard lower than that proposed, e.g., a refinery average standard of 5 ppm. Other commenters recommended higher sulfur standards, e.g., a refinery average standard of 150 ppm. We have concluded that gasoline sulfur levels averaging 30 ppm and not exceeding 80 ppm are necessary to enable Tier 2 emission control technology for all cars and light-trucks (including sport utility vehicles). The cap is necessary to limit the irreversible loss in performance of emission control catalysts from short term higher sulfur refueling events, while the average is needed to ensure consistent emissions performance over the life of the vehicle. If we adopted less stringent sulfur standards, we could not require Tier 2 standards as stringent as those we have selected for all of these vehicle classes. Without the Tier 2 standards and the gasoline sulfur control which enables these standards, we would lose many of the emissions benefits that we will get from this program. See our responses to comments I and J for more on this subject.

Moreover, we believe the standards adopted today are feasible for the refining industry.

Our conclusions about the technical feasibility of the Tier 2 standards and the emissions reductions to be achieved from the Tier 2/gasoline sulfur program are summarized in our Regulatory Impact Analysis. To accommodate real concerns about the costs and other impacts on the refining industry, we phase in the gasoline sulfur requirements over several years. In doing this, we acknowledge that some Tier 2 vehicles will be operated for one or more years on higher sulfur gasoline, and could experience some irreversible loss in emissions performance. However, we concluded that this was a reasonable compromise to make in the short term to achieve our final goal of reducing emissions by requiring Tier 2 vehicles and the low sulfur gasoline they need. We believe the entire refining industry can comply with our requirements under the program we have developed.

We do not believe it is appropriate to adopt a sulfur standard more stringent than the 30 ppm refinery average and 80 ppm per gallon cap standards at this time. While lower sulfur levels would allow many current and future vehicles to achieve still lower emissions, they are not necessary to enable the emission control technologies which are required to meet the Tier 2 standards. Similarly, advanced engine technologies designed primarily for improved fuel economy may need very low sulfur levels, but these advanced technologies are not necessary to meet the Tier 2 standards. We will continue to evaluate the fuel needs of these technologies as they become commercially available in the U.S.

Moreover, our analysis shows that the cost of achieving very low sulfur levels would be significant in the time frame in which our program is implemented. While some refining technologies exist today which could enable some refiners to consistently meet very low sulfur levels (5-10 ppm, as suggested by some comments), as we currently understand them these technologies would be very costly to install in every refinery in the country. More research is needed to develop and perfect cost-effective technologies capable of consistently producing gasoline meeting these tight specifications.

**COMMENTS I and J:** Since it is unclear what technology will be employed by the car manufacturers to meet the Tier 2 standards, the final sulfur level necessary for reducing emissions by using these technologies is uncertain, and EPA fails to appropriately link the vehicle emissions targets to the gasoline sulfur levels. **(American Petroleum Institute (IV-D-114), American Petroleum Institute (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** Both of these comments question the final sulfur levels we believe are necessary to enable vehicles to meet the Tier 2 standards (a cap of 80 ppm and an annual average of 30 ppm), arguing that we haven't made the technical showing that these levels are necessary. Our technical evaluation of the feasibility of the Tier 2 standards with these sulfur levels, and of the sulfur sensitivity and irreversibility of catalysts that will be used in Tier 2 vehicles, is presented in the Regulatory Impact Analysis.

As we discussed in the proposed rule, we have concluded that a 30 ppm average and 80 ppm cap are necessary and appropriate to enable the emissions reductions needed from Tier 2 vehicles. We believe that Tier 2 vehicles that operate on gasoline will, on average over their long-term operation, have to use fuel with sulfur levels no greater than 30 ppm to avoid significant impairment of their emissions control systems. Furthermore, short-term operation on gasoline with sulfur levels higher than 80 ppm will have a significant adverse effect on the desired emission performance and will significantly impair the

emissions control system. The vast majority of test data we have reviewed show that sulfur has a negative impact on catalyst operation even at these low levels. Most of the data from test programs that looked at the emissions impacts of various sulfur levels tested a minimum sulfur level of approximately 30 ppm. However, while there is little data demonstrating the emissions impact of even lower sulfur levels, we have concluded that sulfur levels below 30 ppm are not necessary to allow manufacturers to meet the Tier 2 standards, since we have been able to demonstrate compliance with the standards using 30 ppm gasoline. The data that are available clearly show a non-linear trend in the relationship between sulfur level and emissions, with the greater incremental increase in emissions at lower sulfur levels. Thus, increases above the levels expected from a 30/80 provision would quickly lead to substantial loss in conversion efficiency and resulting impairment of the emission control technology. This data suggest that the emission reductions we seek from Tier 2 vehicles would be ensured by sulfur levels at or near 30 ppm but would not be ensured at levels above this. Furthermore, while some commenters have suggested that if we have an 80 ppm cap the average would naturally fall around 30 ppm (and thus we don't need an average standard), there would be no guarantee that such a average would be consistently produced. Over time, as operation of the desulfurization technologies is optimized, refiners could produce gasoline averaging higher than 30 ppm, resulting in a loss in emissions performance. We concluded that we could not finalize an average standard greater than 30 ppm, or a cap with no average standard, and still justify the Tier 2 standards we have finalized.

Given this need for limiting the average sulfur level to 30 ppm, we believe a cap of 80 ppm is appropriate to provide adequate insurance that Tier 2 vehicles will be able to maintain their expected emissions performance in-use. Some commenters have argued that with a 30 ppm average standard, no cap is needed. We disagree. The inverse of the argument that an 80 ppm cap would result in a 30 ppm average without the need for an averaging standard does not hold true. While there would be some limit on maximum sulfur levels expected from a refinery which produces gasoline averaging 30 ppm resulting from limitations on the operation of the refinery, there is no guarantee that levels at or near 80 ppm would be the maximum realized. Furthermore, unforeseen circumstances could result in temporarily higher sulfur levels unless a cap restricted such gasoline from being marketed. Because the sulfur sensitivity and irreversibility are major concerns, and since the data show the non-linear relationship referenced above, we cannot justify sulfur levels above 80 ppm and expect the emissions reductions we have cited for this program.

Some commenters also stated that EPA did not evaluate the cost-effectiveness of other, higher sulfur standards compared to the proposed 30/80 ppm average/cap standards. As stated above, these standards are based on EPA's assessment of the sulfur levels needed to achieve necessary emissions benefits and to avoid significant impairment of emissions control systems of Tier 2 and LEV vehicles. Moreover, Section 211(c) does not require EPA to evaluate the cost-effectiveness of each and every possible sulfur level, once the Agency has made the threshold findings required by the statute in deciding to regulate sulfur in gasoline. See Amoco Oil Co. et al. v. EPA, 501 F.2d. 722, 735-36 (D.C. Cir., 1974).

**COMMENT K:** [Reserved] [See Issue 23.2.1(I)]

**COMMENT L:** [Reserved] [See Issue 15.B]

**COMMENT M:** EPA should relax the caps on imported gasoline to a permanent level of 300 ppm while maintaining the requirement that all gasoline meet the 30 ppm average. Importers then would be able to buy higher sulfur fuels abroad while achieving the average through the purchase of credits. In the end, environmental consequences will be identical to the present scheme and EPA's objectives will be achieved. **(Sutherland, Asbill, & Brennan LLP (IV-D-225))**

**RESPONSE:** See our responses to Issue 15 for our explanation of why we believe a per-gallon cap is necessary, and why 300 ppm is a reasonable interim cap.

**COMMENT N:** Contrary to the preamble suggestion concerning the possibility of a second round of sulfur reductions, it is important for EPA to establish the final sulfur level at this time and avoid potential future restrictions that would result in inefficient capital investment. **(Mobil Oil Corp. (IV-D-113), p. 13)**

**RESPONSE:** We have based our final sulfur level on the needs of Tier 2 vehicles and on the additional adverse environmental impacts of sulfur in gasoline. Additional information may become available in the future which supports further controls on gasoline sulfur. Hence, we cannot determine whether future reductions in gasoline sulfur levels and even tighter tailpipe standards will be needed, and thus we cannot state that no additional regulation of gasoline sulfur (or any other gasoline property) will occur in the future. If we determine at some future date that additional gasoline sulfur reductions are necessary, we will work with all interested parties to determine the most cost-effective and reasonable course of action.

**COMMENT O:** [Reserved] [See Issue 17.3.G]

**COMMENT P:** The 80 ppm per gallon cap is unnecessary and inefficient. EPA justifies this cap on the belief that "it would be required to provide appropriate insurance for maintaining Tier 2 standards in use and to give automakers an indication of the maximum sulfur levels for which they would need to design their vehicles." However, if sulfur's irreversibility is not a big concern, as commenter believes, then neither a maximum cap nor a national standard is necessary. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 21)**

**RESPONSE:** See our responses to Issue 15 for our explanation of why we believe a per-gallon cap is necessary, including our conclusions about the irreversibility of the sulfur impact on automotive catalysts. The RIA also presents our technical discussion about irreversibility.



## ISSUE 15: INTERIM SULFUR CAPS

**COMMENTS A, B, and C:** The proposed interim caps are too high and will negate the potential benefits that could be achieved because higher sulfur levels have the potential to poison the catalyst. Some of these commenters support 160 ppm in 2004 and 120 ppm in 2005, while another supports 150 ppm in 2004, 120 ppm in 2005, 80 ppm in 2006 and thereafter. An agency association supports 80 ppm in 2004, and this and other commenters argue that the 300 ppm interim cap as proposed by EPA is too high; many of the commenters note that this is almost the same as the current national average of 330 ppm. Two of the commenters state generally that the interim and final caps should be phased in more quickly. (**Alliance of Automobile Manufacturers (IV-D-115), p. 140-141, American Lung Association (IV-D-167), p. 13-14, American Lung Association of Gulfcoast Florida (IV-D-108), American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), American Lung Association of New Jersey (IV-D-211), American Lung Association of Santa Clara-San Benito (IV-D-106), American Lung Association of South Dakota (IV-D-94), American Lung Association of Virginia (IV-D-153), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Atlanta) (IV-F-132), Appalachian Mountain Club (IV-D-251), Clean Air Council (IV-F-28), Gutierrez, R. (IV-D-55), International Center for Technology Assessment (IV-D-122), p. 8, International Center for Technology Assessment (IV-D-122), p. 8-9, New Hampshire Dept. of Environmental Services (IV-D-163), Ozone Transport Commission (IV-D-112), p. 4, Physicians for Social Responsibility (IV-D-194), p. 4, Puget Sound Air Pollution Control Agency (IV-D-138), Sierra Club (IV-F-14), (STAPPA/ALAPCO (IV-D-67), p. 16), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (IV-F-55), Volkswagen of America, Inc. (IV-D-60), p. 2)**)

**RESPONSE:** Some commenters expressed concern that the 300 ppm per gallon cap in 2004-05 is too high, since the current national average sulfur level is 330 ppm, and that the per gallon caps at this level will undercut the potential environmental benefits. Commenters also supported phasing in the per gallon cap of 80 ppm more quickly than proposed. As we explain in the preamble, the final rule strikes a balance between providing Tier 2 vehicles the needed protection from high gasoline sulfur levels and implementing a requirement that is feasible for gasoline refiners to meet beginning in 2004. Our final conclusion is that Tier 2 vehicles cannot be exposed to sulfur levels substantially higher than 80 ppm without incurring an irreversible loss in emissions performance. However, the entire refining industry cannot meet an 80 ppm cap by 2004 without realizing costs substantially higher than we believe are reasonable. Even regardless of costs, it is questionable whether the entire industry could meet the standard by 2004 because of the logistics involved in installing equipment in approximately 100 refineries. Hence, we have instituted an interim cap for two years while average sulfur levels decline, to provide some limited protection for the first Tier 2 vehicles introduced while refiners make the changes necessary to meet the 80 ppm standard by 2006.

The set of standards (the refinery average, the per-gallon cap, and the corporate pool average) together will ensure that gasoline sulfur levels begin to decline no later than 2004, and we expect some sulfur reductions to occur even earlier due to the incentives provided through the ABT program. Thus, the per gallon cap in 2004 and 2005 must be considered in conjunction with the refinery average standard (30 ppm in 2005) and the corporate pool average standards (120 ppm in 2004 and 90 ppm in 2005). Compliance with these average standards will ensure that a significant portion of the national

gasoline pool will have lower sulfur content compared to current levels, since all gasoline cannot be at 300 ppm and still meet the average standards. While some Tier 2 vehicles may see some gasoline that is at or near 300 ppm in the early years of the program, the impact will be relatively minor in light of the overall program benefits, since Tier 2 vehicles will constitute a fairly small portion of the total vehicle fleet in 2004-05. Our Regulatory Impact Analysis discusses the technical feasibility of the refining industry to meet these requirements, including our projections of the rate at which refineries will make changes to comply with the 80 ppm cap in the years leading up to 2006. (See also our responses to Issue 17, particularly 17.3, which deal with comments on the relationship between the interim caps and the sulfur ABT program.)

**COMMENT D:** EPA should not require a specific interim standard for small refiners. The negative economic impact of meeting the interim standard of 200 ppm may be too high. Small refineries may be forced to install the same new equipment to meet the 200 ppm level that will ultimately be required to meet the 30 ppm standard. This would effectively negate any potential economic benefits to the small refiner. One commenter recommends that instead EPA allow small refiners to use their 1997-98 baseline during the interim standard period (includes specific revision to 80.240(a)). To document concerns with small refiner interim standards, this commenter provides an overview of the significant impacts (including closure) on small refinery owned by the commenter. **(Countrymark Cooperative, Inc. (IV-D-154), p. 2-3M Gary-Williams Energy Corp. (IV-D-74), p. 2, Gary-Williams Energy Corporation (IV-F-41), Murphy Oil USA, Inc. (IV-D-117), p. 12-14, Pennzoil-Quaker State Co. (IV-D-128), p. 6, United Refining Company (IV-D-147), p. 2, United Refining Company (IV-F-99), Wyoming Refining Company (IV-F-127))**

**RESPONSE:** See our response to Issue 18.2.

**COMMENT E:** A declining sulfur level requirement -- 250 ppm in 2004, 175 ppm in 2005, and 100 ppm in 2006 -- should be placed on each refiner's gasoline production during this period. In addition, a 350 ppm cap should apply in 2004. This approach provides significant emission reductions while spreading uniformly industry planning. The 350 ppm cap will provide significant protection to emission control systems and encourage the refiners with highest levels of sulfur to invest in new technology, while not placing all of the burden of uncertainty about reversibility on refiners. **(U.S. Department of Energy (IV-D-121), p. 8)**

**RESPONSE:** As explained in response to Comments A-C in this Issue 15, we selected the interim cap based on what we believe to be the minimum level of protection that Tier 2 vehicles require from high sulfur levels. Based on our judgement, we do not believe an interim cap of 350 ppm applicable across the industry in 2004 would provide adequate protection for emission control systems. We do not agree that the 300 ppm cap, compared to a 350 ppm cap, places all of the burden of uncertainty about reversibility on refiners. As explained in our technical evaluation in the RIA and our responses to Issue 14, we believe we must control gasoline sulfur levels to a maximum of 300 ppm (for most gasoline) in 2004 not only because of the irreversibility of the sulfur impact on automotive catalysts, but also because of the direct sulfur sensitivity of Tier 2 catalysts. These vehicles will not be able to achieve their certified level of emissions performance in-use if they are exposed to high sulfur levels; we have concluded that 300 ppm is the maximum level that most of these vehicles should be exposed to in the interim while sulfur levels

come down to the ultimate 80 ppm cap. However, to accommodate those refiners who would have to invest in control technologies to meet the 300 ppm cap in 2004 (perhaps at a higher cost than they would incur if they could delay the investment a year) but could meet a slightly higher cap through operational changes not requiring new equipment, we do allow refiners to exceed the 300 ppm cap modestly in 2004. Any refiner producing gasoline which exceeds the 300 ppm cap in 2004 must compensate for this by producing gasoline meeting a more restrictive cap in 2005. For example, if a refiner produces a batch or batches of gasoline containing 325 ppm sulfur in 2004, he must ensure that all gasoline he produces in 2005 meets a cap no greater than 275 ppm. Even with this increased flexibility, however, in no case may any batch of gasoline exceed 350 ppm in 2004 (except for gasoline produced by some small refiners, as provided in the small refiner standards). (See also our response to Issue 17.3 for EPA's response to the recommendation about a declining corporate average requirement.)

**COMMENT F:** EPA should eliminate the interim caps. [Note: see Issue 17.3, Comment D for most comments on this issue in the context of the ABT program.] The caps are arbitrary and unsupported and could increase the risk of supply problems. The interim caps will also interfere with the ABT program. **(National Petrochemical and Refiners Association (IV-D-118), p. 16)**

**RESPONSE:** As we explain in our response to Comments A-C in this Issue 15, we do not believe the interim caps are arbitrary and should thus be eliminated, but rather that they are necessary to provide protection for Tier vehicles. LEV vehicles already on the road or being sold as Tier 2 vehicles are phased-in will also benefit from the reduced sulfur levels. This level of protection exceeds that which will be realized by the declining corporate average standards during the interim phase-down period (since average standards alone would do little to control maximum sulfur levels of individual batches of gasoline), but is necessary since the average standards would not limit the maximum sulfur levels seen by any Tier 2 vehicles. (See also our response to Issue 17.3 below for additional responses on this issue as it relates to the ABT program.) We disagree that the caps increase the risk of supply problems, because we believe refiners can meet them (as evidenced by our analysis of refinery investments presented in the RIA). To the extent that the commenter was suggesting that the caps may result in supply problems in the event of refinery upsets, turnarounds, etc., see our response on this subject in Comment 26.2.2.G.1.

**COMMENT G:** EPA must carefully determine appropriate interim caps for small refiners so that the interim standards do not force those refiners to install more costly staged investments that would be inconsistent with the policy of small refiner relief. **(State of Wisconsin (IV-D-166))**

**RESPONSE:** See our response to Issue 18.2.

## ISSUE 16: START DATE - GASOLINE

**COMMENTS A and C:** A number of commenters support the proposed start date. One group argues that, in fact, EPA's proposed gasoline sulfur standards allow too much time to pass before significant air pollution benefits can be expected. To ensure that a cleaner Federal program will start in the 2004 model year, another commenter states that EPA must finalize the Tier 2 and gasoline sulfur program by the end of the calendar year. Any delay or substantive weakening of the programs will create uncertainties for achieving the emissions benefits and will therefore shift the burden of these emission reduction responsibilities back onto states. The Alliance states that refiners' concerns that the phase-in schedule is too tight and will create an unreasonable workload are unfounded as recent experiences in other countries indicate that the schedule is reasonable and feasible. The UK has been implementing a small tax incentive program since 1997 and within months after the UK implemented the program's third phase in March 1999, virtually all the diesel fuel in the UK was able to achieve the 50 ppm sulfur cap. In addition, Canada has determined that its new nationwide 30/80 ppm sulfur specifications are attainable by 2005, with an interim level of 150 ppm by 2002. Many companies, especially the larger ones, already have begun preparing for sulfur control and will be ready to provide the controlled fuel well in advance of the deadline, which will reduce any potential bottlenecks in resource availability. **(Alliance of Automobile Manufacturers (IV-D-115), p. 124, 140-142, American Lung Association of Santa Clara-San Benito (IV-D-106), Chicago Dept. of the Environment (IV-D-200), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 7, National Automobile Dealers Association (IV-D-129), p. 3, Oregon Department of Environmental Quality (IV-F-57), Ozone Transport Commission (IV-D-99), Ozone Transport Commission (IV-D-112), p. 1, Ozone Transport Commission (IV-F-4), Puget Sound Air Pollution Control Agency (IV-D-138), Texas Natural Resource Conservation Commission (IV-D-232), Tosco Corp. (IV-D-111), p. 2), U.S. Public Interest Research Group (IV-F-102))**

**RESPONSE:** Some commenters supported the proposed start date for the sulfur program. As described in the preamble and the RIA, we have concluded that the proposed start date is appropriate. The first Tier 2 vehicles will be produced for the 2004 model year. Thus, it is important that sulfur levels begin to decline substantially beginning in 2004. We believe 2004 is the earliest that we can require refiners to meet the gasoline sulfur standards because of the lead time they require and the great number of refineries impacted by this action. At the same time, we expect some sulfur reductions, which will result in modest emissions reductions, to occur even earlier as some refiners voluntarily reduce sulfur levels beginning as soon as 2000. We believe our ABT program provides the incentives for many refiners to act quickly and that states will realize benefits from this program in a reasonable time frame. We do not believe that the experience of refiners in Europe and Canada should lead us to further accelerate the program. As the commenters point out, one of the reasons that European refineries were able to respond so quickly without unreasonable costs were the tax incentives that were provided them; we do not have the option of offering similar support and thus must follow the time line we have set. Similarly, while there are a lot of similarities between Canadian and U.S. refineries, the size of the Canadian industry is significantly smaller than the U.S. industry. We do not believe it would be possible to require all U.S. refineries to meet the deadlines that Canada is imposing because of the limitations on available technologies, design and construction firms, and other support systems. In fact, this was the basis for the design of our ABT program, which, as discussed in the preamble and elsewhere, was developed to allow the industry to spread

out investments in an orderly manner without undue disruptions to supply or unreasonable costs.

**COMMENT B:** It is appropriate to allow refiners that participate in the proposed ABT program until 2006 to meet the 80 ppm cap. For those that do not participate in the ABT program, the 80 ppm cap should apply beginning in 2004. **(STAPPA/ALAPCO (IV-D-67), p. 16; att. 1, p. 2, STAPPA/ALAPCO (IV-F-6))**

**RESPONSE:** Since the ABT program is a voluntary measure meant to provide greater flexibility in meeting the requirements in 2004-2006 (while providing some incentives for early sulfur reductions), we do not believe it would be appropriate to penalize those refiners who do not generate early credits through the ABT program by requiring them to meet the 80 ppm cap in 2004, earlier than other refiners. We have not been able to estimate with certainty how many refineries may make early sulfur reductions, but we do not believe a large number of refineries will do so (although those that do will generate a considerable number of credits for use toward the average standards). Hence, under the commenter's approach, the number of refiners who would be required to meet the 80 ppm standard in 2004 would be substantial. Because many of the technologies for desulfurization are still evolving, we believe that requiring a substantial number of refineries to meet the 80 ppm cap in 2004 would result in significantly higher costs and possible supply shortages due to an inability to meet such a tight deadline. The final program represents an orderly transition to a national sulfur cap of 80 ppm, under which refiners will be able to spread out installation of desulfurization equipment over a number of years. Requiring a potentially significant number of refiners to meet the 80 ppm cap two years earlier would likely disrupt this transition because more refiners will need to install desulfurization technology in 2002-2003 than under the approach we have adopted. However, we remain hopeful that many refineries will in fact elect to meet the 80 ppm cap (and 30 ppm standard) before 2006, and believe the sulfur ABT program will provide the incentives for some to do so.

**COMMENTS D, E, G, H.3, H.4, I, K, and R.4:** Several commenters argue that EPA should extend the compliance deadline for refiners. One of these commenters states that in no event should compliance be required earlier than 2006 if both gasoline and diesel are required to meet lower sulfur standards in the same timeframe. The better course would be to complete the phase-in of low sulfur gasoline standards prior to imposing a similar requirement on diesel fuel. In terms of flexible strategies, the best strategy is simply to allow refiners more time to meet these standards in order to plan and to gain the benefits of experience with the low sulfur gasoline rule, and to allow the further development and testing of new technology to address the problem.

Another refiner states that EPA should allow the refining industry a transition time of an additional four years (2008) to comply with the proposed standards. This could be accomplished through a well-designed banking and trading program such as that suggested by NPRA. In addition, small refineries should be given until 2008 to comply with the proposed standards.

A federal agency recommends that the compliance deadline should be extended to 2007. The additional time is necessary (1) to resolve regulatory uncertainties critical to refiner investment decision making and refinery planning; (2) to address the true lead times required for installing desulfurization equipment; (3) to avoid an overload on

technology vendors and skilled labor in the construction industry; (4) to allow cost reductions through "learning" the efficacy of new technology from its application to early units; (5) to allow integration of gasoline desulfurization technology installation with ongoing refinery revamps or FCC unit turnarounds; and (6) to spread out over several years refinery construction and shutdowns, thus minimizing loss in gasoline supply at any one time. As one example of uncertainties and the need for more lead time, the volume of diesel fuel that will need to be desulfurized and the sulfur level required in that diesel fuel may result in the choice of FCC unit feed desulfurization rather than the gasoline stream desulfurization that EPA has assumed. Another example is that the loss of MTBE as an octane source could result in the choice of a different gasoline desulfurization technology that is more effective at preserving or enhancing octane level.

Other commenters recommend alternatives. One recommends that the 30 ppm average not apply until 2008 and that a 150 ppm average apply from 2004 until 2008 in order to allow an opportunity for refiners to consider new, more cost-effective technologies. Another proposes extending compliance deadline to 2010 and setting a 300 ppm sulfur cap through 2007 with a three year phase-in to 30/80 ppm. Another suggests that if EPA, consistent with the schedule of the EU and Canada, delayed the Tier 2 sulfur program one or two years, refiners large and small could take advantage of the lower cost technology for sulfur extraction. Also, more companies, regardless of size, could meet the desired 30 ppm standard. Thus, delayed implementation would result in one sulfur standard for all parties in the gasoline distribution system. Another states that a delay is a simple matter of fairness given the long phase-in periods given to the auto industry under the proposal, while others state that in order to be consistent with recently published intentions of Canada and the European Union to start the implementation of similar gasoline sulfur regulations in 2005, EPA should delay its requirement until 2005 at the very earliest.

One commenter states that with sufficient notice and a more realistic compliance deadline, refiners can prepare to meet any new standard that is set. Such lead-time would allow for proper budgeting and creation of reserves which may be necessary. Ultimately, the compliance deadline, combined with the sulfur standard to be reached, will determine the cost of compliance.

The proposed time frame for compliance may not be realistic or feasible for most refiners. Additional time is needed to prove the effectiveness of new technology and/or to ensure that there is adequate time for States/EPA to review and issue the necessary permits. One of these commenters critiques Table IV-13 in the RIA which shows time ranges for individual steps and cumulative time ranges for each step. Commenter notes that EPA adds only 6 months to the cumulative time column for all refineries and also seems to add too little cumulative time for the detailed engineering step. Using this table, if the high end of the ranges were added to cumulative time, then the total time range would be 3.25-5.75 years, with a midpoint of 4.5 years. That range may be appropriate. Commenter also notes that this adjustment to the range adversely affects EPA's estimates of the timing of generating early credits.

Another commenter adds that more time would enable the potential development of new technologies such as biotreating. Because the traditional desulfurization technologies are energy intensive and produce greenhouse gases, a longer period to implement the program could provide substantial overall environmental benefits. At the same time, it would reduce the risk of fuel supply disruptions, not lock refineries into less desirable technologies, and would allow further evaluation of the environmental benefits and

marginal costs of reducing sulfur.

Several refining interests argue that refiners will be forced to rely on more expensive traditional technologies for desulfurization because the new technologies will not be widely available in the timeframe envisioned by the proposed rule. One commenter notes that both the OCTGAIN and CD Tech technologies have not been fully demonstrated and even then have not come close to having been demonstrated in more than one refining environment. Another commenter argues that EPA can maintain the proposed start date only if it develops a carefully balanced ABT program that will enable refineries to put off much of the desulfurization efforts until the 2005-2007 period at which time new desulfurization technologies should be available.

Several commenters also argue that the design and construction work necessary to implement the low sulfur gasoline proposal requirements will severely strain available engineering and construction resources. One adds that if refiners all choose the new technologies, as EPA has presumed, it is questionable whether a limited number of vendors can meet the needs of more than 100 refineries in the next few years. Another states that a short timeline will unfairly raise prices for the industry. Vendors that supply piping, fitting, vessels, instruments, and catalyst will raise prices because of tight supply. This will put a premium on everything that a refiner buys for these new units. A tight timeline will raise these prices needlessly. A longer, more gradual implementation will allow the market to adjust and behave according to historical trends.

Finally, one commenter notes generally that simple equity plus the reality of the vehicle phase-in schedule suggests at a minimum that a four-year, two-step program should be implemented for gasoline sulfur. EPA is introducing great risk to the gasoline consumer and oil industry by rushing very severe standards onto the oil industry in two years (2004-2006) while allowing five years for vehicles (2004-2009).

**(American Institute of Chemical Engineers (IV-D-242), American Petroleum Institute (IV-D-114), p. 16, BP Amoco (IV-D-58), p. 4, Chevron Products Company (IV-D-62), p. 3, 6, Conoco, Inc. (IV-D-124), p. 2 and att., Equiva Services LLC (IV-D-168), Ergon, Inc. (IV-D-157), p. 7-8, Exxon Company, USA (IV-D-119), Flying J Inc. (IV-D-151), p. 2, Giant Industries, Inc. (IV-D-66), p. 2-3, Giant Industries, Inc. (IV-D-92), p. 3, Grooms, L. K. (SC State Senator) (IV-D-84), Independent Fuel Terminal Operators Association (IV-D-158), p. 5-6, 10, Koch Petroleum Group, LP (IV-D-72), p. 12-13, Marathon Ashland Petroleum LLC (IV-D-81), p. 2-3, 5, 11, National Petrochemical and Refiners Association (IV-D-118), p. 2-3, 16-18, 19-20, 52, Phillips Petroleum Company (IV-D-82), p. 2-3, A5-A6, Senate Hearing Materials (IV-D-229), Sen Inhofe, p. 1, Sinclair Oil Corp. (IV-D-150), Ex. 1, p. 9; Ex. 2, p. 7-8, Sunoco, Inc. (IV-D-73), p. 4-5, U.S. Department of Energy (IV-D-121), p. 5-6, 8, Valero Energy Corporation (IV-F-78), Williams Companies, Inc. (IV-D-53), p. 1, Williams Energy Services (IV-F-114), Citgo Petroleum Corporation (IV-F-33), Coastal Corporation (IV-D-159), p. 2-3, Colorado Automobile Dealers Assoc./National Automobile Dealers Assoc. (IV-F-123), Conoco, Inc. (IV-F-120), Marathon Ashland (Philadelphia - Day 1) (IV-F-131), National Petrochemical and Refiners Association (IV-F-19), Norco Refining Company (IV-F-20), Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 22, Senate Hearing Materials (IV-D-229), Marathon statement, p. 3-4, Sinclair Oil (Denver) (IV-F-133), Sinclair Oil Corp. (IV-D-150), Ex. 1, p. 7-8; Ex. 2, p. 6-7, Sunoco, Inc. (Philadelphia - Day 1) (IV-F-131), The Coastal Corporation (Refining and Chemical Division) (IV-F-73))**

**RESPONSE:** Generally, all of these comments argue for implementing the 30 ppm average/80 ppm cap standards later than 2006 (some recommend an implementation date as late as 2010). Various reasons for delaying this date are presented, such as providing adequate time for refiners to consider new, lower cost desulfurization technologies or providing the industry time to adjust not only to gasoline sulfur control but also future requirements for diesel fuel and other fuel issues, providing sufficient time to obtain necessary permits for refinery modifications and to obtain necessary design and construction resources, reducing the risk of supply disruptions, and ensuring consistency with sulfur controls in the European Union and Canada. Some commenters offered specific recommendations about alternative programs that would include a later implementation date but would also address some of our concerns about protecting the Tier 2 vehicles that will be on the road in earlier years. For example, one commenter recommended a refinery average standard of 100 ppm sulfur beginning in 2004 (with a 300 ppm per gallon cap beginning in October 2003), followed by a 30 ppm refinery average standard in 2008 (with an 80 ppm per gallon cap beginning in the same year). One commenter also stated that the proposal would require the refining industry to introduce low sulfur gasoline over a shorter time frame than the auto industry would have to phase-in Tier 2 vehicles.

We have considered all of these comments and have made changes to some aspects of our program in response to these concerns. One significant change is delaying the 30 ppm refinery average standard to 2005, rather than the proposed date of 2004. Our refinery-specific analysis of expected timing of desulfurization investments shows that this delay, combined with other program modifications in the final rule, results in a longer time period over which refiners will be making investments. Other important modifications in the final rule include changes to the proposed ABT program that will result in the generation of more early credits, which also helps enable a smooth transition to low sulfur gasoline. The geographic phase-in of our standards is an additional flexibility that helps to ensure that the 30 ppm standard will be feasible for all refiners, because it gives some refiners an additional year to comply with the 30 ppm standard in light of their unique circumstances without losing environmental benefits in the areas in most need of emissions reductions.

However, we concluded that the 2006 deadline for the 30 ppm refinery average standard is necessary for the large majority of gasoline because it represents the date by which a substantial number of new vehicles will be required to meet Tier 2 standards. Extending the phase-in of the 30/80 standards would jeopardize the environmental benefits of the program by exposing a greater number of Tier 2 vehicles to sulfur levels as high as 300 ppm, which, while better than the maximum levels seen today, will still result in higher emissions than Tier 2 vehicles would experience with 80 ppm. As we explain in the Regulatory Impact Analysis, we have re-analyzed the ability of the refining industry to meet the 2006 deadline for the 30 ppm avg/80 ppm cap standards (2008 for most small refiners), and have concluded that it is reasonable to establish this deadline in conjunction with our program start date of 2004. We believe the new desulfurization technologies will be sufficiently demonstrated to allow refiners to select a cost-effective desulfurization technology and install it by 2006, if not sooner, and that refiners will be able to obtain the engineering and construction support needed to install the equipment. Similarly, as explained in the preamble, we believe we can help states expedite the permitting process so that it does not become a roadblock to implementation. Collectively, these actions will help to reduce the risk of any supply disruptions in the first years of the program.



For more information on specific details raised in some of these comments, see also our responses to Issue 13.F, Issue 15, Issue 17.3, and Issue 31.

**COMMENT F:** The Tier 2 phase-in period should be extended to provide fuel suppliers additional time to implement an infrastructure which would support 0-5 ppm sulfur fuel. **(Detroit Diesel Corporation (IV-F-92), Detroit Diesel Corporation (IV-F-96))**

**RESPONSE:** As we explain in our responses to Issue 14, we do not believe it is appropriate at this time to adopt very low sulfur standards (the 0-5 ppm level suggested by this commenter). We acknowledge that future developments in engine and emission control technologies and future actions to improve air quality may lead us to conclude that very low gasoline sulfur levels are necessary, but we do not believe it is appropriate to extend the start date for gasoline sulfur control nor the date by which the 30 ppm average/80 ppm cap standards are implemented in anticipation of some future action. To do so would result in the loss of significant needed emissions benefits of the Tier 2/sulfur program, which will result largely from implementation of low sulfur gasoline requirements in the early years of the program.

**COMMENTS H.1 and R.2:** Senator Bennett raised some questions regarding why the implementation schedule is so tight. California's achievement of a 30 ppm gasoline sulfur standard took place over a 20 year period. Given that the rest of the country does not have the severe California air quality problems, how can EPA justify the proposed schedule? In addition, why would EPA require the implementation of the new sulfur standards in 2004 when only a small percentage of the Tier II vehicles will be on the road? Another commenter argues that EPA cannot use the CA experience to justify the 80/30 levels because the CA refineries are extremely sophisticated, limited in number, and had the advantage of a 300 ppm cap for 16 years. **( Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Bennett Questions, p. 1, Sunoco, Inc. (IV-D-73), p. 5-6)**

**RESPONSE:** California's reformulated gasoline standards (CaRFG 2), which took effect in 1996, control many gasoline properties, not only gasoline sulfur. While California did have a 300 ppm cap on sulfur levels for about 20 years prior to the 1996 start of the CaRFG 2 program, California did not finalize its CaRFG 2 requirements until late 1991 (with further amendments adopting the Predictive Model not completed until 1994). Thus, California refiners were given only slightly more than four years to respond to the requirements, a lead time similar to that which refiners nationwide will have to respond to our requirements. Furthermore, the time provided to California refiners required substantial refining changes beyond sulfur reduction; it is not clear that 4+ years would have been provided if sulfur levels were the only change made in CaRFG 2. The experience gained at California refineries, as well as the improvements in desulfurization technology which have occurred since then, will help the rest of the industry respond to the federal requirements more efficiently.

**COMMENT H.2:** Commenter notes that construction schedules in Alaska pose unique problems with meeting the proposed compliance date. In addition, there is no ability to import an arctic grade fuel from other areas, so the only option for supplying Alaska fuel

needs is refinery modification for Alaska refineries. **(Williams Companies, Inc. (IV-D-53), p. 1-3)**

**RESPONSE:** We agree that refiners in Alaska, much like refiners in other Western states, face unique situations that would make compliance with the 30 ppm average/80 ppm cap standards difficult in the short term, and that the limitations on supply pipelines could present supply problems if refiners were unable to meet our deadlines. Hence, we included Alaska in the area where refiners can opt into the geographic phase-in of the sulfur standards. This will allow interested refiners in Alaska an additional year - until 2007 - to meet the 30 ppm/80 ppm standards. We believe seven years is adequate time to provide for Alaskan refineries to comply with these standards.

**COMMENT J: COMMENT J:** Gasoline sulfur reduction for most refiners will occur in a single step. Thus, the timing of the 300 ppm batch limit and the entire sulfur reduction program should be pushed back accordingly to allow for a minimum four-year lead time from the time the rule is promulgated. A four-year lead time period is consistent with previous regulatory actions and is the minimum time necessary given all of the design, construction and permitting steps that are necessary. Even if the rule is promulgated by the beginning of 2000, that does not provide a 4-year window given the proposed compliance date of October 1, 2003. One of the commenters argues that EPA has no support for the statement that permitting can occur in a 6-12 month time frame, and such a statement is inconsistent with real-world experience. This commenter also points to CARB experience and notes that one reason those refiners were able to act in a shorter time period is the flexibility with gasoline manufactured in neighboring states. A national sulfur cap reduces that type of flexibility. **(American Petroleum Institute (IV-D-114), p. 11-12, Marathon Ashland Petroleum LLC (IV-D-81), p. 10-11, Mobil Oil Corp. (IV-D-113), p. 1, NPRA (IV-A-10), p. 11)**

**RESPONSE:** The commenters note that the proposed October 1, 2003 compliance date for the per gallon cap does not provide a full four years lead time, even if the rule is promulgated by the beginning of 2000. The commenters also question EPA's statement that permits for refinery modifications can be obtained in 6-12 months. In addition, the commenters note that one reason refiners in California were able to meet the CARB low sulfur gasoline requirement in a shorter time period is that they had flexibility to import gasoline produced outside California in the event of a supply disruption, and a national sulfur standard reduced that kind of flexibility.

We have eliminated the proposed October 2003 compliance date to provide a full four years from the date we finalized the regulations to the date when refiners must comply with the first gasoline sulfur cap standard. The per-gallon cap standard takes effect January 1, 2004. Downstream cap standards become effective in February, 2004. As we have explained in the preamble and in responses to other comments, we believe we are providing adequate lead time for the industry to meet these standards. Responses to the comments regarding permitting are found in Issue 20.

We disagree that the California experience argues for additional lead time for the federal program. While our program begins in 2004 (and some refiners will reduce sulfur levels even earlier), refiners do not have to comply with the 30 ppm standard until 2005 (later if they take advantage of ABT credits) or with the 80 ppm cap until 2006. Furthermore, those refiners which are expected to have the most difficulty in complying, and thus would have the potentially greatest negative impact on supply - small refiners and those

in certain Western states - have the option of delaying compliance an additional 1-2 years while meeting interim standards. Since we believe that our program will provide for an orderly transition to low sulfur gasoline, as supported by analyses provided in the RIA, we do not expect supply shortfalls.

**COMMENT L:** The proposal's timing is not entirely consistent with the schedule for Tier 2 vehicles. Many Tier 2 vehicles, which must be sold beginning in 2004MY under EPA's proposal, will be subjected to higher sulfur gasoline that is not phased out until 2006 (longer for smaller refiners). This disparity in vehicle standards and fuel quality needs to be addressed by EPA in its in-use compliance testing program. **(Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 3-4)**

**RESPONSE:** As we explain in our response to Issue 15 (Comments A, B, and C), we acknowledge the balance between providing adequate lead time for the refining industry to meet these standards and the scheduled phase-in of Tier 2 vehicles. In our current in-use testing program we provide a petition process for manufacturers to request a sulfur purge test cycle prior to evaluation of vehicles that they believe have been compromised by exposure to high sulfur levels. This procedure remains in effect, and can be used by auto manufacturers for vehicles certified to the Tier 2 standards.

**COMMENT M:** The timing for Tier 2 implementation is inconsistent with the language of the CAA and extends beyond the fuels timetable. The CAA specifies that the Administrator study the availability of meeting Tier 2 standards for model years "commencing not earlier than January 1, 2003 and not later than model year 2006." The current EPA proposal allows for a phase in of Tier 2 light duty vehicles through model year 2007, which means that the standards are not fully applicable until "later than model year 2006." There is no such specification for modification of fuel quality, yet EPA has suggested a 2006 compliance date. If EPA determines that Tier 2 standards can continue to be phased in past the 2006 date, then, at the very least, the same should be applicable to the fuels program. If the 2007 date used for final vehicle implementation does not allow refiners adequate time to meet the sulfur standard (which is the case for 30 ppm), then a later date should be specified. **(National Petrochemical and Refiners Association (IV-D-118), p. 15)**

**RESPONSE:** The Tier 2 vehicle standards commence in the 2004 model year and thus are consistent with the language in section 202(i). Nothing in section 202(i) indicates that the Tier 2 standards cannot be phased in over time. Moreover, section 202(i) states that nothing in that paragraph prohibits EPA from exercising its authority under section 202(a) to promulgate more stringent standards for LDVs and LDT1s at any time after model year 2006. Regarding, the commenter's discussion of a 2006 compliance date for fuel sulfur standards, it should be remembered that the 2007 model year actually begins in calendar year 2006 for virtually all of these vehicles. Moreover, seventy-five percent of vehicles subject to section 202(i) will be fully phased in to the Tier 2 standards by 2006, and lower fuel sulfur levels will benefit these vehicles, as well as other LDVs and LDTs, such as NLEV vehicles and interim Tier 2 vehicles.

**COMMENTS N - P:** The phase-in of the 80-ppm sulfur cap should be shortened. **(20/20 Vision (Denver) (IV-F-133), American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Appalachian Mountain Club (IV-D-251), Department of Environmental Health,**

**City and County of Denver (IV-F-62), Erin Kelly (Denver) (IV-F-133), League of Women Voters (IV-D-213), Mathur, A.T. (IV-F-106), Physicians for Social Responsibility (IV-D-194), STAPPA/ALAPCO (IV-F-117)** In certain cases, multiple individuals supporting this point were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was over 500. **(International Center for Technology Assessment (IV-D-182), Multiple Private Citizens (IV-D-1, 2, 6, 7, 9, 12, 15, 16, 22, 27, 29-31, 33, 144, 160, 172, 184, 230, 267 and 269), Transcript of Emails Received (IV-D-36, 37, 236, 239, and 240), Voicemail Transcript Reports (IV-D-34))**

EPA should adopt a national gasoline sulfur cap in the range of 200 ppm to be effective as close to 2001 as possible to reduce in-use emissions from the current motor vehicle fleet and a national sulfur cap of no higher than 80 ppm to be phased in no later than 2003. **(Alabama Dept. of Environmental Management (IV-D-201), STAPPA/ALAPCO (IV-D-67), p. 1c; att. 1, p. 2, STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77))**

The lower sulfur standards should take effect sooner than proposed. Low sulfur gasoline should be available nationwide prior to 2004, when the first Tier 2-compliant vehicles will be in use. To delay the implementation of sulfur standards would undermine the Tier 2 and NLEV programs, and/or the ability of States to address attainment deadlines. **(20/20 Vision (IV-F-38), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Atlanta) (IV-F-132), American Lung Association of Colorado (Denver) (IV-F-133), American Lung Association of Michigan (IV-F-94), American Lung Association of New Jersey (IV-D-211), American Lung Association of Northern Ohio (IV-F-110), American Lung Association of Ohio (IV-F-65), Campaign on Auto Pollution (IV-F-44), Clean Air Council (IV-F-28), Clean Air Network, et. al. (IV-F-95), Colorado Environmental Coalition (IV-F-87), Detroit Diesel Corporation (IV-D-52), p. 3, Earth Day Coalition (IV-F-82), EcoCity Cleveland (IV-F-84), Fletcher, Robert E. (Atlanta) (IV-F-132), Frumarkin, Howard (Atlanta) (IV-F-132), Fund for Public Interest Research (Atlanta) (IV-F-132), GA House of Representatives (Atlanta) (IV-F-132), Galik, D.S. (IV-F-79), Gutierrez, R. (IV-D-55), Kostmeyer, Peter (IV-F-27), Langon, John (Philadelphia - Day 2) (IV-F-131), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Mason, P. (IV-F-70), Michigan Environment Council (IV-F-105), NE Ohio Impact Project (IV-F-80), NJ Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), New Jersey Environmental Lobby (IV-D-261), Ohio Lung Association (Cleveland) (IV-F-134), Ohio Public Interest Research Group (IV-F-98), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), SC Department of Health and Environmental Control (IV-D-56), p. 4, STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Sierra Club - northeastern OH (Cleveland) (IV-F-134), Sierra Club, Pennsylvania Chapter (IV-F-37), Trepal, C. (IV-F-109), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Cleveland) (IV-F-134), Volkswagen of America, Inc. (IV-D-60), p. 2)**

**RESPONSE:** These comments generally argue that the 2004 start date and 2006 date for the 80 ppm cap is too late, providing inadequate protection for Tier 2 vehicles and foregoing needed air quality benefits in the intervening years. While we have considered these comments, as we explain in our responses to Issue 15, we have selected these dates based on what we believe to be a reasonable balance between air quality goals, the needs of Tier 2 vehicles, and the ability of the refining industry to respond to these standards. The final program strikes an appropriate balance among these concerns, and achieves significant emissions benefits in a time frame that is feasible for the refining

industry.

**COMMENT Q:** EPA should phase-in near-zero sulfur fuel concurrent with the phase-in of Tier 2 vehicles. The Alliance proposal for Tier 2 standards is designed to match the implementation of low sulfur fuels with the introduction of new vehicle technologies. If EPA adopts the Alliance plan, manufacturers can accept delaying the implementation of near-zero sulfur fuels until 2008 with an interim standard of 30 ppm sulfur in 2004. However, if EPA implements the more aggressive timetable for implementing vehicle standards as proposed, then 5 ppm sulfur fuel should be available in the marketplace by 2004. Also, refiners should have no problems with the proposed implementation schedule for low sulfur gasoline. Timing should have little impact of cost or feasibility, except to the extent that a phase-in process helps spread out investment costs.  
**(Alliance of Automobile Manufacturers (IV-D-115), p. 110-127)**

**RESPONSE:** As we explain in our responses to Issue 14, we have not concluded that Tier 2 vehicles, even the heavier light-duty trucks, need very low sulfur to meet the standards. We have proven the technology in our own laboratory and believe the majority of existing data support our conclusions. See the Regulatory Impact Analysis for more discussion on this issue.

**COMMENT R:** Commenter proposes achieving 80/30 ppm values in 2008, with 300 ppm cap from 10/1/93 and 100 ppm average from 2004 until final 80/30 levels apply. EPA provides no justification for the interim step down in sulfur levels in the cap and averages between 2004 and 2006. The fleet penetration of Tier 2 vehicles in that period will be very small and the structure of the vehicle standards is such that those vehicles will be the ones that can meet the Tier 2 standards with current technology and fuels. By holding the 300 ppm cap, EPA would reduce supply risk and allow more time for reviewing new technology. Commenter also notes that with the 300 ppm cap, EPA should consider an option that would require Tier 2 vehicles to operate on premium gasoline until 2008. Nearly all premium already meets the 300 ppm cap, and by 2000 probably all RFG II gasoline will meet the cap. Gasoline dispensers/vehicle fill pipes could be adapted to implement this option. **(Sunoco, Inc. (IV-D-73), p. 4-8)**

**RESPONSE:** In addition to the comments covered by an earlier response, the commenter suggested that the 80 ppm cap could be delayed until 2008 by requiring Tier 2 vehicles to use premium gasoline until that time, arguing that premium gasoline already meets the 300 ppm cap (a level which the party believes to be sufficient for the duration of an interim program). The comment suggests that unique gasoline dispenser nozzles and fuel-fill pipes could be designed to prevent misfueling of these vehicles.

We do not believe that requiring Tier 2 vehicles to use premium gasoline during the phase-in of such vehicles is a necessary or appropriate solution to the concerns raised by the commenter. As we explain in other responses to comments under Issue 16, we disagree that it is satisfactory to expose many Tier 2 vehicles to gasoline containing as much as 300 ppm sulfur. While our program does expose some Tier 2 vehicles to gasoline sulfur levels this high, we have sought to minimize the number of vehicles exposed by maintaining the interim cap for only two years. Extending the cap to 2008 would harm the emission control systems of too many Tier 2 vehicles, jeopardizing the environmental benefits of the program. Furthermore, the NLEV vehicles that will continue to be sold as Tier 2 vehicles are phased in will also benefit from low sulfur

levels before 2008 (including from 2004-06, when benefits from low sulfur gasoline used in the existing fleet are significant); these benefits would be reduced if we extend the interim standard.

Furthermore, while it is highly likely that premium gasoline will contain less than 300 ppm sulfur as the commenter suggests (based on currently available data), there would be no guarantee that premium gasoline sulfur levels wouldn't exceed this level if we adopted the recommendation. Even if we were quite certain that no premium gasoline would be produced exceeding 300 ppm, the costs involved with requiring the manufacture of Tier 2 vehicles with unique fuel-fill pipes - a requirement that would exclude any vehicle produced for the California LEV-II program from meeting Tier 2 standards - as well as the costs of requiring all premium gasoline pumps to change nozzles, would not be insignificant. Many small businesses would be impacted by such a decision. Collectively, it does not appear that such an approach would merit the two year delay in the 80 ppm cap that the commenter suggests. Furthermore, as we've explained elsewhere, with our redesigned program, we are confident that the industry can meet our standards by 2006.

**COMMENT R.3:** EPA should also explain the need for averages at all. To enable the technology the cap should be sufficient. The overall air quality effects are the same given the results on average values when a cap is imposed. **(Sunoco, Inc. (IV-D-73), p. 7)**

**RESPONSE:** See our responses to Issue 15, which explain the need for both interim caps and average standards.

**COMMENT S:** EPA should strengthen the incentives for early compliance with the sulfur requirements. **(Chicago Dept. of the Environment (IV-D-200))**

**RESPONSE:** By making the sulfur ABT program more flexible, we believe we have increased the incentive for refiners to lower sulfur levels prior to 2004. See our responses to Issue 17 for more on this subject.

**COMMENT T:** EPA has constructed an estimated leadtime requirement for project completion which is internally inconsistent, has no factual basis and is based largely on anecdotal comments. EPA has asserted that permit timing can be reduced to as short as six months to at most a year. The RIA provides as a basis for this assertion that EPA has committed to working to streamline the process. The Agency's commitment provides no foundation for this assumption. **(NPRA (IV-A-10), p. 7-8)**

**RESPONSE:** EPA has modified its projection of required leadtime relative to the schedule provided in the Draft RIA in a number of ways. First, we corrected a slight error of 3 months in the minimum cumulative time, due to refiners inability to begin construction prior to receiving a permit. Second, we updated our projection of permitting time based on information received via an extensive process conducted with refinery industry and state and local staffs to review the permitting process and ways in which it could be speeded up. Third, we also better explained the overlap assumed to occur between the various steps involved in constructing new equipment. We also evaluated the overall time necessary to design and build a new unit under today's situation of light construction activity. We increased this time considerably to account for back-ups which may occur during time of heavy construction activity.

NPRA's comment concerning the permitting process is addressed under Issue 20. below.

**COMMENT U:** EPA states that because the proposal specified a single specification, it does not require the 4 years afforded the Complex model implementation, which needed to provide time to understand the Complex model. This statement is inconsistent with their previous discussion on emerging technologies and irrelevant to the gasoline sulfur regulation. **(NPRA (IV-A-10), p. 11)**

**RESPONSE:** EPA only cites the situation regarding the leadtime given to implement the Complex Model and the Phase 1 RFG requirements as an example of a major new gasoline quality regulation which only required four years of leadtime. EPA's primary justification for the sufficiency of four years is based on its timeline for the steps involved in designing and constructing new equipment. This timeline includes consideration of the need to evaluate current and developing technology.

## ISSUE 17: ABT PROGRAM - GASOLINE SULFUR

### Issue 17.1: ABT Program Generally

**COMMENTS A and D:** Supports the concept of an ABT program for gasoline sulfur. (American Petroleum Institute (IV-D-114), p. 7, Coastal Corporation (IV-D-159), p. 5, Conoco, Inc. (IV-D-124), p. 1, Environmental Defense Fund (IV-D-174), p. 12, Environmental Defense Fund (Denver) (IV-F-133), Equiva Services LLC (IV-D-168), Ergon, Inc. (IV-D-157), p. 7, Fina Oil and Chemical Company (IV-D-152), p. 3, Giant Industries, Inc. (IV-D-66), p. 3, Maine Dept. of Environmental Protection (IV-D-177), Massachusetts Department of Environmental Protection (IV-D-137), p. 7, National Petrochemical and Refiners Association (IV-D-118), p. 60, NESCAUM (IV-D-130), p. 4, Oregon (Office of the Governor) (IV-D-27), Pennzoil-Quaker State Co. (IV-D-128), p. 7-8, Phillips Petroleum Company (IV-D-82), p. 3, Sinclair Oil (Denver) (IV-F-133), Sinclair Oil Corp. (IV-D-150), Ex. 2, p. 8, Society of Independent Gasoline Marketers of America (IV-D-156), p. 11, State of Connecticut, Dept. of Environmental Protection (IV-F-2), State of Wisconsin (IV-D-166), Williams Companies, Inc. (IV-D-53), p. 4, Wisconsin Transportation Builders Association (IV-D-185)) The ABT program should (1) encourage early action by refiners; (2) help reduce costs to consumers and assist in assuring adequate gasoline supplies throughout the U.S.; and (3) be flexible enough in credit generation and timing to enhance the introduction of new sulfur reduction technologies in refineries. In addition, enforcement and documentation should be simple and transparent, yet have enough "boundaries" and oversight to discourage any potential "gaming". (**BP Amoco (IV-D-58), p. 2-3**) The ABT program as proposed provides adequate refiner flexibility -- EPA should not attempt to provide more lenient provisions. (**Ohio Public Interest Research Group (IV-F-98)**)

**RESPONSE:** These comments generally supported our ABT program as proposed. We have made modest changes in our program, as explained in the preamble, because we concluded that the proposed program would not provide the intended flexibilities and thus that refiners would not reduce sulfur levels early or be able to spread out investments on a reasonable schedule. We've based our conclusions on further analysis, including a review of the anticipated the timing for capital equipment installation for every refinery in the country. We now have greater certainty that our final program will accomplish the goals we set out in the NPRM for the ABT program.

**COMMENTS B, C, and K:** Opposes the concept of an ABT program for gasoline sulfur. (Sunoco, Inc. (IV-D-73), p. 9, Sunoco, Inc. (Philadelphia - Day 1) (IV-F-131)) The program is discriminatory against those refiners that will have to invest in the most significant sulfur reduction technologies and favors those refiners that can conduct minor projects to generate credits in the early years. Revisions to the program are unlikely to eliminate these significant disparities. In fact, some suggested fixes would likely be even more problematic, such as extending the time for credit use or raising the 150 ppm trigger level. Also notes that even the small refiners opposed a phase-in of gasoline sulfur standards during the SBREFA process. The best approach is to have a clear standard that must be achieved and a level playing field for all refiners.

(**Mobil Oil Corp. (IV-D-113), p. 1-3**) The focus on the ABT program distracts from more important issues associated with the rulemaking. Drastic changes to the ABT program could address some concerns. (**Exxon Company, USA (IV-D-119), p. 2-3**) The ABT program as proposed may allow some oil companies to sell gasoline with high sulfur levels, which will compromise new emissions control equipment. EPA should not compromise air quality for the sake of flexibility for the oil industry. (**Alliance of Automobile Manufacturers (IV-D-115), p. 143-144, Bell, S. (IV-F-89), Sierra Club (IV-F-3)**)



The proposed ABT program benefits primarily large refiners who own a number of refineries for which ABT allows significant flexibility internal to the company. This benefit creates a degree of inequality between these large players and a number of smaller, but not "small", refiners who own one or two refineries and who will benefit little from the proposed ABT program. These refiners represent 10 to 20 percent of the U.S. gasoline supplies in the aggregate and they will find themselves at an even greater competitive disadvantage without any "relief" mechanisms. Loss of any of this refining capacity would mean a much tighter gasoline supply and increased imports.

**(Pennzoil-Quaker State Co. (IV-D-128), p. 7-8, U.S. Department of Energy (IV-D-121), p. 5)**

**RESPONSE:** As we discussed in the proposal and reiterate in the preamble, we believe an ABT program is necessary to enable implementation of the standards beginning in 2004. The ABT program, as adopted today, provides significant incentives for early sulfur reductions, and in doing so enables some refiners to install desulfurization technology later than would otherwise be possible, since they can use credits to comply with the average standards. Thus, ABT provisions avoid a situation where EPA would have to delay the start date for the 30 ppm standard (and, as a result, possibly delay the start date for phasing in Tier 2 vehicles) because of concerns that all refiners could not install desulfurization equipment in a short time frame. By spreading out the time frame in which installation of desulfurization technology will occur, the ABT program allows for environmental benefits earlier than would otherwise occur. The ABT program, with the addition of sulfur allotments, also allows us to reduce sulfur levels in the interim period at a greater rate than may otherwise be possible.

Contrary to the opinion expressed by one commenter, we do not believe the ABT program compromises air quality, because it encourages early sulfur reductions which benefit vehicles already in the fleet and enables the Tier 2 vehicle standards as soon as 2004. While some Tier 2 vehicles may see limited volumes of gasoline at higher sulfur levels in the early years of the program, the impact will be relatively minor in light of the overall program benefits, since Tier 2 vehicles will constitute a fairly small portion of the total vehicle fleet at that time.

We also do not agree that the ABT program will create competitive advantages for some refiners, at the expense of others, particularly those with only one or two refineries. Compliance with the corporate average standards, and generation of allotments, is on a corporate basis (with the exception of early generation in 2003); all companies have equal potential to participate. Since participation in the credit portion of ABT program is on a refinery basis, any refiner, regardless of number of refineries, has the potential to be able to generate credits prior to 2004, or to use credits in 2005 and beyond, depending on the plans for their individual refinery. Most refiners have told us that they treat each refinery as a separate business unit, so while there is some potential that a refiner will trade credits among its corporate refineries before making credits available on the open market, we believe that many refiners will make credits available to other companies, especially since the modifications we have made to the proposed ABT program will further encourage generation of early credits. Thus, refiners with one or two refineries will be able to obtain sulfur credits from the marketplace if they need them, and may also generate credits through operational changes short of installing desulfurization equipment, as can refiners with more refineries.

**COMMENTS E and G:** The proposed ABT program is too complex and inflexible, and does not foster sufficient early credit generation in 2000-2001. Without significant revisions, the program will not result in the flexibility EPA intends and the industry needs. **(Citgo Petroleum Corp. (IV-D-126), p. 1-2, Citgo Petroleum Corporation (IV-F-33), Coastal Corporation (IV-D-159), p. 5, Conoco, Inc. (IV-D-124), p. 1, Exxon Company, USA (IV-D-119),**

**p. 3, Independent Fuel Terminal Operators Association (IV-D-158), p. 9-10, Marathon Ashland (Philadelphia - Day 1) (IV-F-131), National Petrochemical and Refiners Association (IV-F-19), Sinclair Oil Corp. (IV-D-150), Ex. 2, p. 8 Society of Independent Gasoline Marketers of America (IV-D-156), p. 11, Williams Energy Services (IV-F-114))**

Commenters included at least some of the following elements of a banking and trading program as important general principles: (1) Banking and trading should occur with minimum restrictions, be easy to understand and implement, and allow unambiguous enforcement. (2) Banking and trading should be voluntary and applicable to all. (3) It should be centered around a refinery compliance scenario allowing for average compliance at the refinery. (4) 2000 should be the first year for generating early credits. (5) Sulfur credits should not be labeled as RFG vs conventional gasoline, summer vs winter gasoline, northern vs southern RVP/VOC. (6) Credits should be generated on a calendar year period and used for compliance on a calendar year period. (7) Sulfur credit banking and trading should not require any changes to downstream product transfer documents. (8) Sulfur credits should be transferred directly from the refiner that created them to the refiner using the credits to achieve compliance, and EPA should not operate a national gasoline sulfur credit bank or have to preapprove trades. (9) Retail sulfur surveys should not be required as a result of the inclusion of a gasoline sulfur credit banking and trading program. (10) An ABT program should include provisions for shutdowns, turnovers, turnarounds and upsets. (11) The program should subsume the small refiner provisions. (12) EPA should front-load (in 2000 and 2001) the maximum generation of early credits. **(American Petroleum Institute (IV-D-114), p. 7-10, Fina Oil and Chemical Company (IV-D-152), p. 3, 6, Marathon Ashland Petroleum LLC (IV-D-81), p. 21-23, National Petrochemical and Refiners Association (IV-D-118), p. 2, 63-68, Sunoco, Inc. (IV-D-73), p. 10-11, 20)**

A workable program can be devised if it adheres to the following principles: (1) The program should be fair and equitable to all. (2) Enough credits must be generated so that construction schedules for refinery modifications can be spread out over 6-8 years. (3) The program must be simple and, at the same time, enforceable both at the refinery gate and downstream of the refinery gate. **(Chevron Products Company (IV-D-62), p. 1, 3)** Two commenters provided detailed analysis to document that, using EPA's proposal, insufficient credits would be generated. **(Koch Petroleum Group, LP (IV-D-72), p. 14-16, National Petrochemical and Refiners Association (IV-D-118), p. 60-63)** Other commenters argue that EPA's program must be restructured to generate sufficient early credits in 2000-2001 to provide certainty of credit availability. Otherwise, refiners will not be able to factor in credits for project decision making, and more early desulfurization projects will have to be undertaken than EPA is projecting. Commenters provided analysis of the RIA assumptions to document that EPA has underestimated the number of projects that will be required given the backloading of credits in 2003. One commenter also compared project decision making schedules with the credit generation schedules to document this same point. Another commenter urged that 2000 be retained as a full credit generating year even if the rulemaking is promulgated after 12/31/1999. **(American Petroleum Institute (IV-D-114), p. 9-10, Ergon, Inc. (IV-D-157), p. 7, National Petrochemical and Refiners Association (IV-D-118), p. 60-63, Phillips Petroleum Company (IV-D-82), p. 3, A6, A8-9, A12, Sunoco, Inc. (IV-D-73), p. 10-12)**

One commenter does not believe that the ABT program will work as EPA has assumed and is concerned that it may fail to provide a manageable transition for all refiners in a way that would keep costs to a minimum, avoid refinery closures, and minimize supply disruptions. Much of the complexity of the EPA proposal for an ABT program occurs because there is no standard against which to measure performance, and the apparent goal of "equity" would deny current low sulfur gasoline producers credit for their better-than-average performance. The Department of Energy believes that the larger equity issues are addressed by allowing all refiners more time to achieve the 30 ppm goal, and by having a transparent and workable

credit and trading program. **(U.S. Department of Energy (IV-D-121), p. 9)**

Some commenters offer alternative proposal for a banking and trading program. The key elements of the alternative plan include: (1) four years for generating early credits, ending Dec. 31, 2003; (2) all early credits to be used by Dec. 31, 2007, no matter when generated; (3) no time limits on use of credits generated after 2004; (4) sulfur level in each refinery's 1990 anti-dumping baseline used as base for generating sulfur credits during early period; (5) refineries with baselines below the minimum trigger value use declining thresholds (from 300 to 150) as the basis for generating sulfur credits during each successive year of the early period; (6) RFG credits not calculated separately, but are considered part of gasoline pool; (7) early credit generation is designed to make "wet barrel" sulfur controlling rather than 30 ppm average sulfur maximum over first four years of program; (8) corporate pool average is removed and handled through credits and per gallon cap; and (9) 300 ppm sulfur cap is extended through 2007. NPRA provides a similar alternative. The commenters provide an analysis to show the positive impacts of this alternative on credit generation. The commenters also argue that this approach shifts any windfall credits to the refineries that have been supplying lower sulfur gasoline rather than those that are delaying desulfurization. **(Koch Petroleum Group, LP (IV-D-72), p. 16-19, National Petrochemical and Refiners Association (IV-D-118), p. 66-68)**

Another commenter provides several scenarios for a modified credit system designed to significantly increase the availability of early credits in a timeframe compatible with project decision making. These options generally involve use of an industry average baseline (using the 1990 industry average of approximately 340 ppm) with no trigger levels, or a sliding scale of trigger levels in each successive year of the early credit period. The options also incorporate special provisions for RFG or CG refiners with low baselines so that they can generate credits to the extent their baselines are below 150 ppm. **(Sunoco, Inc. (IV-D-73), p. 17-20)**

A federal agency suggests EPA should adopt a simplified form of sulfur reduction credit averaging and trading built around the 2004 to 2006 sulfur reduction requirements (the phased-in averages), 350 to 80, respectively. The credits that refiners need or can sell would depend on their realized or expected performance relative to the annual standard. Refiners would be allowed to sell credits/allowances generated from expected performance better than the standard and could offer such credits for sale as soon as the rule is signed. The sale of such credits would create a new annual average sulfur standard for the refiner, for the year(s) for which the credit is sold. Refiners could buy credits for current or future years to make up the difference between their actual or expected performance and the annual standard. Because the credits would be based on actual performance in a given year, vis-a-vis the required average standard for that year, there would be no basis or reason for "trigger levels," "baselines," or RFG "take-aways." **(U.S. Department of Energy (IV-D-121), p. 9)**

**RESPONSE:** These comments generally suggest changes to the ABT program, arguing that the program as proposed was too complex and would not result in real sulfur credits being generated. Some commenters also described alternative ABT programs for our consideration. We considered these comments carefully as we designed our final ABT program. As we explain in the preamble, we have relaxed the trigger for generating credits, established an expeditious process for establishing a sulfur baseline, and clarified other requirements for the ABT program. We believe these modifications address the concerns raised, and make the program more workable. Most importantly, we believe the program has an improved potential for resulting in real credit generation and thus for allowing the refining industry to spread out investments in desulfurization technology by giving some refineries the ability to delay construction while purchasing sulfur credits in the first years.

From the start of the ABT program, the industry will have six years in which to bring down actual sulfur levels to comply with the 30 ppm standard (not including those small refiners and refiners participating in the geographic phase-in program which will have even more time).

We disagree with the comments which suggest that corporate pool average standards are unnecessary. We believe they are necessary, for several reasons. First, we've removed the 30 ppm refinery average standard we proposed for 2004; without a corporate pool average standard in 2004 there would be little guarantee that sulfur levels would decline substantially below the 300 ppm cap. While we have designed the program to permit higher sulfur levels in 2004, the emissions benefits we have evaluated in 2004 are based on gasoline which averages 120 ppm; substantially fewer emissions reductions would be realized if actual sulfur levels were consistently at or near 300 ppm. Second, since ABT credits can be used against the 30 ppm standard in 2005, we need the corporate average standards to ensure a continued decline in sulfur levels. Otherwise, refiners could average significantly higher while meeting the 300 ppm cap in 2005, thereby reducing significantly the benefits of the program in this year. While we are allowing inter-company trading around the corporate averages, most of the traded allotments will have been generated in the same year, so that on an industry-wide basis the average will in fact be very close to 120 ppm in 2004 and 90 ppm in 2005. The provisions which allow allotments generated in 2003 to be used in 2004, or allotments in 2004 to be carried over to 2005, do have a small impact on the actual sulfur levels that will be realized nationwide. However, we have minimized this impact by substantially discounting allotments which are carried over to the next year. Thus, our analysis of the emissions benefits in 2004 is consistent with our final program.

We also disagree that the small refiner provisions are unnecessary in light of the ABT program. Our analysis of the rate at which refiners will invest in new desulfurization technologies, which gives some indication of the expected rate of generation and use of ABT credits, assumed that small refiners would have the ability to meet alternate standards and delay construction even longer than other refiners. This analysis indicates that the industry will have sufficient credits. However, if small refiners were held to the same standards as the rest of the industry, it is not clear that sufficient credits would be available to allow them to delay construction. Furthermore, since the ABT program is primarily aimed at providing flexibilities until 2006 (at the latest), small refiners would not see the same benefits through the ABT program alone. For the reasons presented in the preamble and in our responses to Issue 18, we believe most small refiners need more time to comply with our requirements, so the ABT program would be an inadequate substitute for the small refiner provisions.

There are several specific comments which we will address elsewhere. Our response to the comment suggesting that we should not require downstream PTD changes can be found in our responses on Issue 21. We are not requiring retail sulfur surveys (nor did we propose to). Our response to concerns about refinery turnovers, etc., can be found in the preamble and also in our response to Comment 26.2.2.G.1. Our response to comments on the life of credits generated after 2004 can be found below in Issue 17.4 (D,E,F,K). See Issue 16 for our thoughts on recommendations to extend the 300 ppm cap through 2007.

**COMMENT F:** EPA should clarify that credit generation is on an individual refinery basis. **(BP Amoco (IV-F-74), Fina Oil and Chemical Company (IV-D-152), p. 4)** The rule indicates that credit generation is on a refiner basis although the preamble discussion indicates that EPA intended for generation on a refinery basis. **(BP Amoco (IV-D-58), p. 3, Koch Petroleum Group, LP (IV-D-72), p. 21-22, National Petrochemical and Refiners Association (IV-D-118), p. 64, Phillips Petroleum Company (IV-D-82), p. A12, Sunoco, Inc. (IV-D-73), p. 31)** Allowing early credits to be generated on an individual refinery basis would enhance the flexibility of the program and the ease in generating and accounting for credits. It would also create an

opportunity to more efficiently allocate capital and thus mitigate the overall cost of gasoline sulfur reductions, and minimize questions about credit generation that could arise from future sales/purchases of refineries. **(BP Amoco (IV-D-58), p. 3)** Although credit generation should be on a refinery basis, overall compliance should be based on a corporate sulfur pool average (by refiner). **(American Petroleum Institute (IV-D-114), p. 10, Marathon Ashland Petroleum LLC (IV-D-81), p. 23)**

**RESPONSE:** The commenters pointed out that the proposed regulatory text provides for credit generation on a refiner basis, although the preamble discussion refers to credit generation on a refinery basis. Some commenters also stated that, while credit generation should be on a refinery basis, compliance should be based on a corporate sulfur pool average. We have clarified this issue. It was our original intention that credit generation and use would be on a refinery basis, since it is the refinery that has to comply with the 30 ppm refinery average standard, not the refiner. Thus, the final rule provides that credits are generated on a refinery basis. The refiner (that is, the corporation) complies with the corporate pool average standards in 2004 and 2005.

**COMMENTS H and J:** Opposes proposed compliance supplement pool as an unwarranted and unwise new government entity. **(Koch Petroleum Group, LP (IV-D-72), p. 22)** This commenter and another also generally oppose an allowance-based or reserved credit program. **(Phillips Petroleum Company (IV-D-82), p. A15)** Reserved credit program appears to be an illegal tax on large refiners to benefit small/medium refiners. **(Koch Petroleum Group, LP (IV-D-72), p. 22-23)** However, a federal agency supports proposed compliance supplement pool. The compliance pool would not need to be large. The Department of Energy estimates that a compliance pool as small as 10 ppm, on 2004 and 2005 gasoline volume, would be adequate to give refiners confidence in the program and to establish price transparency. **(U.S. Department of Energy (IV-D-121), p. 9)**

**RESPONSE:** We did not adopt a compliance supplement pool or any type of credit reserve system in the final rule's sulfur ABT program. We concluded that such provisions are unnecessary given the changes we've made from the proposal to the ABT program. We requested comment on the compliance supplement pool as a possible way to ensure sufficient availability of credits. Since the modifications we've made to the proposed program will further encourage early reductions, and will result in more credits being available, the compliance supplement pool is not necessary. We did adopt an allotment trading program for the interim years when the corporate average standard applies, by allowing inter-company trading during these years, to provide additional flexibility and certainty for refiners in meeting the corporate average standard. We are also allowing refiners to generate allotments in 2003, as described in the preamble, which provides additional flexibility in meeting the corporate pool average standards. Any excess allotments which have not been used for compliance with the 2004 & 2005 corporate average standards may be converted to credits for use in meeting the 30 ppm refinery average standard, albeit at a 50% discount.

## **Issue 17.2: ABT Baselines, Trigger Levels, and RFG/State Sulfur Issues**

**COMMENTS A - C:** For the ABT program to succeed, it is important that refineries, regardless of baseline sulfur levels, have the opportunity for generating credits that might be used by them or transferred to others. (**American Petroleum Institute (IV-D-114), p. 7, 9, Conoco, Inc. (IV-D-124), p. 2, Fina Oil and Chemical Company (IV-D-152), p. 5**) Consideration should be given to allowing credit for the full reduction achieved in a refinery's conventional gasoline average compared with its baseline. (**BP Amoco (IV-F-74)**) Some commenters suggest that a sliding scale trigger level could be introduced in subsequent years to balance credit generation with gradual sulfur reduction. One of these commenters also suggested that EPA could require a minimum percent reduction for high sulfur baseline refineries to assure that meaningful reductions are achieved. (**Citgo Petroleum Corp. (IV-D-126), p. 2, National Petrochemical and Refiners Association (IV-D-118), p. 66**) For refineries with high sulfur baselines, the use of a 150 ppm trigger precludes the generation of significant early credits because facilities will be unable to have the necessary equipment in place until the 2003 timeframe. Thus, for these units, credits should accrue for any reductions from their baseline. (**Grace Davison (IV-D-140), Phillips Petroleum Company (IV-D-82), p. A9-10**)

Some commenters also state that the 150 ppm trigger level is too restrictive and forces refiners to commit to major sulfur reduction projects, which for many can not be completed until sometime in 2003. Thus, very few credits can be generated in time to help refiners meet the 30 ppm average. (**Conoco, Inc. (IV-D-124), p. 1-2, Fina Oil and Chemical Company (IV-D-152), p. 5, Koch Petroleum Group, LP (IV-D-72), p. 17, Phillips Petroleum Company (IV-D-82), p. A10, Sunoco, Inc. (IV-D-73), p. 17**) Commenters also note that credit generation will be limited because the preamble indicates that refineries that are already below 150 ppm will not be able to generate credits because their low capability is reflected in the 1997-1998 baseline. Some of these commenters urge that the regulatory language apply, which indicates that refineries with low baselines obtain credits for the full reduction below 150 ppm. (**American Petroleum Institute (IV-D-114), p. 8-9, Ergon, Inc. (IV-D-157), p. 7, Marathon Ashland Petroleum LLC (IV-D-81), p. 21-22, Ultramar Diamond Shamrock Corp. (IV-D-75)**)

Commenters also disputed EPA's assumptions concerning refineries manufacturing RFG. They noted that these refineries (at least outside CA) are not likely to drop sulfur levels to the 30 ppm range quickly because they are expected to meet the 150-170 ppm range for RFG through conventional desulfurization or process changes. This further limits the expected generation of early credits. Another commenter stated generally that the generation of early credits from RFG compliance is uncertain and likely overstated. (**American Petroleum Institute (IV-D-114), p. 8-9, Marathon Ashland Petroleum LLC (IV-D-81), p. 21, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 9**)

Finally, one commenter urges EPA to allow for creation of credits without capital intensive investments but rather process and operating changes, such as the use of catalyst additives. This approach recognizes the wide range of baseline sulfur levels that exist and would promote early reductions. (**Grace Davison (IV-D-140)**)

**RESPONSE:** These comments generally raise the question of how credits are generated and valued once the baseline is established. The commenters provide a range of suggestions about how to maximize credit generation and how a trigger should be used, if one should be used at all, in such a program. Since we want to ensure that credits are generated for those refineries that need to buy credits (so they can delay investments a year or two), we have made modifications to our program upon consideration of comments received on this subject. We have concluded that permitting credits to be generated by refineries that make reasonable sulfur reductions, albeit without substantial capital

investment, is reasonable and practical given our desire to encourage sulfur reductions and credit generation as early as the year 2000. Hence, we have implemented only a modest trigger that a refinery must meet before generating credits, equivalent to a 10% reduction from their baseline sulfur level. This trigger is reasonable because it ensures that credits will only be generated by refiners' actual efforts to reduce sulfur levels, rather than rewarding refiners for normal fluctuations in refinery operations that may vary annually (resulting in slight changes in sulfur-related emissions that the environment is already experiencing on a year-to-year basis). Furthermore, we do not treat reformulated gasoline differently from conventional gasoline for the purposes of credit generation, since we want to encourage sulfur reductions from the entire gasoline pool and believe that RFG sulfur levels are currently controlled to some degree by the RFG regulations, so that credits would only be generated for reductions beyond those driven by RFG.

**COMMENTS D.1-D.3:** The proposed ABT program is inequitable since the establishment of the baseline rewards those refiners who have maintained or increased their levels of sulfur in gasoline over the baseline year and penalizes those refiners that have achieved earlier reductions. **(Chevron Products Company (IV-D-62), p. 3, GA Dept. of Natural Resources, Environmental Protection Division (IV-D-57), Inland Refining, Inc. (IV-D-13), p. 2-3, Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 3, Sunoco, Inc. (Philadelphia - Day 1) (IV-F-131), The Coastal Corporation (Refining and Chemical Division) (IV-F-73))** Commenters recommend the following credit scheme: for reductions from a baseline of 600 to a level of 300, one credit for every four ppm sulfur reduction; for a reduction from 300 to 150, one credit for every two ppm sulfur reduction; and for reductions from 150 to 30, one credit for every ppm sulfur reduction. No credits for reduction from a baseline above 600 ppm. **(Maine Dept. of Environmental Protection (IV-D-177), NESCAUM (IV-D-130), p. 6)(See other letters listed under Comments D.4 and D.5 that follow.)**

Credits should be available for reductions that occurred prior to 2000. Commenter notes that it began desulfurization in 1993 in response to Acid Rain program provisions for small diesel refiners. **(Cenex Harvest States (IV-D-131), p. 3-4)** Another commenter recommends that rather than baselines, EPA establish a target level and provide credits for any production below that target level. The target level could start at a higher level in 1999 or 2000 and descend to 30 ppm in 2006. The baseline concept proposed by EPA is conceptually flawed in the following ways: (1) it potentially rewards progress toward but short of compliance; (2) it sends mixed signals to the participants depending on their baseline position; (3) it signals a position that some low sulfur gasoline (that created from high baselines) is good while other low sulfur gasoline is less valuable; (4) it rewards relative efforts as opposed to absolute achievement; (5) it has no relationship to the purpose of the regulation (clean air); and (6) the use of baselines forces the inefficient expenditure of capital. [See also Issue 17.1, Comment G.] **(Wyoming Refining Company (IV-D-148), p. 2-4)**

**RESPONSE:** All of these comments recommend substantial changes to the credit baseline and/or generation approach proposed to change the value of credits generated based on when the sulfur reduction occurred or the amount of sulfur reduction that the refinery realizes. One commenter suggests a "sliding scale" for credit generation, giving more credit for reductions to lower levels. Another suggests that rather than basing credit generation on individual refinery baselines, credits should only be generated by refiners who lower their sulfur averages below a specified target level. Essentially, this would set a "trigger", which could decrease year-by-year, but credits would be generated only for reductions below that trigger rather than the reductions from the baseline. While these approaches would reward refiners who reduce sulfur levels the most, they would only result in a greater degree of sulfur reductions (and credits generated) than our program is expected to result in if the refiners with the highest sulfur levels were able to install the capital equipment to

substantially reduce their sulfur levels. Our analysis of the ability of the industry to respond to the need to reduce sulfur levels indicates that there are only a limited number of refiners who can and will make such investments in the early years of the program (prior to 2004), because of the time needed to get these units constructed and operating. Thus, these approaches would add a level of complexity or additional hurdles to the implementation of the credit program with few additional environmental benefits expected. This would be in direct opposition to our rationale for modifying the ABT program from the proposal, which was to make credit generation easier (while still appropriate) and to ensure that enough credits would be generated to allow other refiners to delay construction beyond 2004.

Another comment suggests that credit should be given for sulfur reductions that occur prior to 2000. Generally, we disagree. Our concerns with the negative impact that sulfur would have on Tier 2 vehicles are based on current sulfur levels - levels which reflect the fact that some refiners are producing low sulfur gasoline already. We've concluded that further reductions are needed. In addition, as stated in the NPRM, we are concerned that giving credits for reductions prior to 2000 will result in a "windfall" for some refiners, i.e., earning credits for reductions that would have been made anyway, regardless of this regulation, including reductions associated with other regulatory requirements. Since credits generated early may be used later to produce gasoline above a 30 ppm refinery average standard, we do not believe that credits should be generated for sulfur reductions that would occur even absent this regulation. However, because we allow credit generation relative to a baseline that is prior to 2000, some refiners will be rewarded (by being able to generate more credits) for reductions made after the baseline year but before 2000.

**COMMENTS D.4 and K:** Commenter recommends that, for refineries producing conventional gasoline or RFG with baselines below 150 ppm, the credit generation trigger should be the national 1997/98 baseline of 305 ppm. This approach would allow these refineries to recoup their early costs for reducing sulfur, and would not negatively impact the gasoline sulfur pool in 2004 and beyond. This approach would also enable early credit generation in 2000 and 2001 too allow more time for installing technology by the fall of 2003. Commenter notes that EPA fails to take into account that the company with the lower baseline has already made the investment to produce low sulfur gasoline. Also, EPA's proposal fails to recognize that the incremental cost of reducing to 30 ppm is not that much different between a refinery with a high baseline and one with a baseline below 150 ppm but above 30 ppm. **(Coastal Corporation (IV-D-159), p. 6-7)**

Supports the concept of a minimum value for refineries with baseline levels below the minimum trigger level. However, believes the threshold should be increased. Suggests a sliding scale of 300, 250, 200, and 150 ppm for the respective years from 2000 to 2003. **(Koch Petroleum Group, LP (IV-D-72), p. 17)** This minimum value approach provides refiners with low sulfur baselines the ability to generate credits, and not be dependent on the availability of sulfur credits from refiners with historically high sulfur baselines. In addition, one commenter notes that EPA has already recognized this logic in allowing credits for summer RFG to be calculated against a 150 ppm threshold even though the refinery's actual baseline may be below that level. **(Phillips Petroleum Company (IV-D-82), p. A9-10, Tosco Corp. (IV-D-111), p. 6-7)**

**RESPONSE:** By improving our sulfur baseline review and instituting only a modest credit trigger, we believe we have made it easier for refineries currently producing lower sulfur gasoline to earn credits if they desire to do so prior to 2004. Allowing credit generation for process changes that lower sulfur levels (rather than solely for sulfur reductions resulting from installation of new capital equipment) allows some refineries to generate credits without having to install the technology they'll ultimately need in 2004 or later to meet the 30 ppm standard. Requiring refiners to use established 1997-98 sulfur baselines from data



previously collected (under our existing reformulated and conventional gasoline requirements) will help us to expedite the review and approval of sulfur baselines. We expect to be able to complete this process within no more than 60 days of receipt of a sulfur baseline; in most cases, it should be much sooner. Furthermore, by having refiners correlate their claimed sulfur average to the specific batch data they have provided in the past, we should be able to identify and resolve any discrepancies quickly. Hence, we believe we have addressed the concerns we (and others) had at the proposal stage with our ability to establish sulfur baselines quickly to expedite the ability of refiners to start generating credits (if they so desire) in the year 2000.

**COMMENTS D.5, E, M, O and Q:** One commenter recommends that EPA use the 1990 baseline for conventional gasoline so that refineries that have recently invested voluntarily in reducing sulfur levels are not penalized. **(Amerada Hess Corp. (IV-D-245))** Other commenters argue that the use of an historic baseline is appropriate, but that it should be set so as to minimize questions about credit legitimacy. Some support the use of the 1990 baseline because those values have been fully audited. The use of the 1997-1998 period introduces uncertainty and potential for significant problems. One commenter in particular noted that the use of the 1990 baseline simplifies enforcement for foreign refiners. **(BP Amoco (IV-D-58), p. 4-5, Fina Oil and Chemical Company (IV-D-152), p. 3, Koch Petroleum Group, LP (IV-D-72), p. 17, National Petrochemical and Refiners Association (IV-D-118), p. 66, Sunoco, Inc. (IV-D-73), p. 9-10, 16-17)**

One commenter opposes the use of the 1990 baseline because it represents only a single year, and is too old. It believes that EPA should instead use the entire four year period from 1995-98. This period captures the true refinery capability and is representative of current operations. The data to support the baseline should be compiled in an auditable format and made subject to independent audit. **(Phillips Petroleum Company (IV-D-82), p. A10-11)** Another commenter suggests that if EPA wants to use the more recent 1997-98 period, it should allow the use of the previous Anti-Dumping data compilations without the need to recalculate the data. **(Fina Oil and Chemical Company (IV-D-152), p. 3)** Another commenter argued that if EPA wants to use the more recent time period as a baseline, it should consider some form of simple verification of refiners' baseline calculations. **(BP Amoco (IV-D-58), p. 5)**

One petroleum industry commenter suggests that renewable oxygenates blended downstream in conventional gasoline should be excluded from the 1997-98 baseline if they were not required to meet anti-dumping compliance requirements (even if included in compliance calculations). **(Sunoco, Inc. (IV-D-73), p. 20)**

Another petroleum industry commenter supports the use of the 1997-98 baseline rather than the 1990 baseline. Using the 1990 baseline would result in large windfalls to many refineries that have taken steps since 1990 to reduce sulfur for a number of reasons (RFG production, anti-dumping compliance, 1993 diesel requirements, or stationary source emission reduction activities). **(Tosco Corp. (IV-D-111), p. 6)**

Finally, a third petroleum industry commenter recommends that a refinery be able to choose a baseline year from a rolling 12-month period within the 5-year period that is most representative of a refinery's normal operations prior to the rule's effective date. Alternatively, a refiner should be able to petition for a baseline change. This type of flexibility is needed because average sulfur content and production volume can change dramatically from year to year. **(Pennzoil-Quaker State Co. (IV-D-128))**

**RESPONSE:** We considered all of the comments received on how to establish a sulfur

baseline for each refinery. For reasons explained in the preamble, we concluded that the use of 1997-98 sulfur levels was most appropriate. As explained in the previous response, we believe we have streamlined the review process to allow us to review and approve refiner sulfur baselines expeditiously. Hence, we expect that refiners will be able to generate sulfur credits as soon as the year 2000, if they so choose.

We disagree with the comment which suggests that the 1995-98 averaging period would be more representative of current refinery operations than the 1997-98 period. As we explain in the preamble, because refineries do make changes to their operations for both regulatory and business reasons, we must use only the most recent data to establish refineries' sulfur baselines. We agree that using more than one years' worth of data is appropriate given the potential for aberrations in a single year. We have concluded that two years' worth of data is optimal; using data that is older than that would likely result in sulfur baselines that are less representative of today's actual sulfur levels. Ideally, we would use 1998-99 data, but we would not be able to verify 1999 data in sufficient time to allow refiners to generate credits in 2000. Thus we finalized the requirement that sulfur baselines be set using 1997-98 data.

Consistent with the proposal, we are requiring that any refiner or importer who included oxygenates blended downstream in the calculations for gasoline qualities in 1997-98 in data previously submitted to the Agency must include the oxygenates in their baseline calculations for ABT. (Refiners have the option, under our anti-dumping regulations applicable to conventional gasoline, whether or not to include downstream oxygenates in their calculations. However, a refiner who does include downstream oxygenates in their calculations must either be the party that blends the oxygenate downstream or must be able to verify that the oxygenate was indeed added.) The addition of oxygenates downstream of the refinery reduces the sulfur content of the finished gasoline (by diluting the sulfur); actual gasoline sulfur levels are thus lower with the addition of oxygenate. Since the purpose of the 1997-98 baseline is to establish current gasoline sulfur levels, it is reasonable to consider this oxygenate. In keeping with our streamlined approach to sulfur baseline review and approval, we believe it is appropriate for refiners to establish their 1997-98 sulfur baseline using the data they have submitted to us previously. The comment did not persuade us that there is a compelling reason to exclude downstream oxygenate from the baseline calculations.

**COMMENTS F, G, H and N:** For winter and summer federal RFG, EPA should set the credit baselines either at the actual levels in the baseline year or 150 ppm, whichever is lower. Refiners that market RFG will be required to lower sulfur in the summer months to meet NO<sub>x</sub> standards, and they probably will include a compliance margin to ensure they meet the standard. Since they will be going below 150 ppm sulfur anyway, EPA should not give them extra credit for doing so. Many refiners participating in the RFG program already have the desulfurization processes installed. It would cost refiners little extra to run desulfurization equipment year round according to analyses conducted by MathPro (MathPro, "Costs of Producing Gasolines With Low Sulfur Content" dated 4/28/97) (**Alliance of Automobile Manufacturers (IV-D-115), p. 143-144**)

Several commenters propose that RFG credits not be handled any differently than conventional gasoline. (**Conoco, Inc. (IV-D-124), p. 2, Equiva Services LLC (IV-D-168), Fina Oil and Chemical Company (IV-D-152), p. 5, Koch Petroleum Group, LP (IV-D-72), p. 17, National Petrochemical and Refiners Association (IV-D-118), p. 66-68**) Another commenter suggests that this is important for simplicity and to avoid any unintended consequences (such as reduced production of isolated pools and supply disruptions based on credit generation decisions). (**Phillips Petroleum Company (IV-D-82), p. A13**)

According to another commenter, CA RFG and federal RFG (winter and summer) should be

excluded from any ABT program since both reformulations are already required separately. Producers of federal RFG would be provided a double incentive if allowed to include the RFG in the ABT program. **(Chevron Products Company (IV-D-62), p. 3)**

Finally, the U.S. Department of Energy notes that the EPA analysis of credit availability under the proposed ABT program does not account for the "loss" of potential sulfur credits due to the Phase II RFG requirements. Even with the proposal to allow use of winter RFG sulfur credits as measured (i.e., no take-away for winter RFG), the commenter estimates that the industry will have 25 to 50 ppm less incremental sulfur credit generation capability across the whole gasoline pool than EPA assumes. For refiners producing high levels of RFG, this loss will be greater, effectively penalizing them for choosing to produce a cleaner gasoline. If the credit program is promulgated as proposed, there may be strong incentive for refiners to not produce summer RFG and supply shortages and price increases could result. **(U.S. Department of Energy (IV-D-121), p. 5)**

**RESPONSE:** While in the proposal we argued that federal RFG should be treated separately from conventional gasoline for credit generation purposes and that credits generated from summer RFG should be limited, we now find that these provisions are unnecessary. Upon studying recent fuel data, we have concluded that the sulfur reductions expected for compliance with the RFG program in the summer months have already occurred, and thus will be accounted for in the refiner's baseline calculations. Refiners have accomplished this primarily by switching gasoline blendstocks between summer and winter production, and thus seasonal variations in RFG sulfur levels will not impact the annual average sulfur levels of the entire gasoline pool. Given that a goal of the ABT program is to encourage sulfur reductions, we want to encourage reductions that lower the overall pool sulfur level regardless of whether they occur in conventional gasoline or RFG, in the summer or the winter. Hence, we allow RFG to be considered along with conventional gasoline for the purposes of credit generation. However, just as we exempt California gasoline from having to meet any of our sulfur provisions, we agree that California gasoline should not be included in a refiner's compliance calculations or the determination of sulfur ABT credits generated.

**COMMENTS I and J:** For state regulated gasoline, the credit baseline should be the actual level in the baseline year or the regulatory maximum, whichever is lower. **(Alliance of Automobile Manufacturers (IV-D-115), p. 143-144)**

Other commenters suggest that state/local sulfur requirements should not be a factor for generating credits. **(Conoco, Inc. (IV-D-124), p. 2, Pennzoil-Quaker State Co. (IV-D-128))** This would promote credit generation while also ensuring that supply decisions are not driven by credit decisions and state regulations are not undermined. **(BP Amoco (IV-D-58), p. 5, Chevron Products Company (IV-D-62), p. 3, Equiva Services LLC (IV-D-168), Fina Oil and Chemical Company (IV-D-152), p. 5, Phillips Petroleum Company (IV-D-82), p. A13)** According to other commenters, a refinery-based program for generating credits would mean not tracking gasoline downstream. Thus, it would not be appropriate to exclude some gasoline from early credit generation on the basis it may be used in a state with a sulfur program. These commenters also argue generally that disallowing credits for gasoline produced for sale in states with low sulfur standards would create an unmanageable tracking problem for an ABT program. **(American Petroleum Institute (IV-D-114), p. 10, Marathon Ashland Petroleum LLC (IV-D-81), p. 23, National Petrochemical and Refiners Association (IV-D-118), p. 64, Tosco Corp. (IV-D-111), p. 7)** One commenter argues that the only State requirements EPA should take into account are the California low-sulfur requirements. **(Equiva Services LLC (IV-D-168), Tosco Corp. (IV-D-111), p. 7)** Another commenter argues that if such a measure remains in the final rule, refiners who have already invested in early programs to reduce sulfur to lower levels will be unfairly penalized under the national

program. **(Georgia Department of Natural Resources (IV-D-180))**

**RESPONSE:** The ABT program is designed to encourage early reductions in sulfur levels and enable some refineries to delay compliance by purchasing credits (allowing for a more orderly transition to low sulfur gasoline production). Whether the refinery is producing lower sulfur gasoline in response to a state requirement or simply based on a corporate decision to reduce average sulfur levels prior to 2004, the gasoline pool benefits, as do all vehicles which use the lower sulfur gasoline. We agree with the commenters who supported allowing gasoline with lower sulfur due to state sulfur requirements to generate credits in the same manner as any other gasoline. Hence, we allow these fuels to be considered in the calculation of credits relative to the refinery's sulfur baseline. Since California gasoline is not subject to the sulfur standards adopted today, however, such gasoline cannot be used to generate credits under the ABT program.

**COMMENT L:** Several commenters oppose a 105 percent volume limit for application of the 150 ppm sulfur baseline. One suggests using the volume provisions of the 1990 baseline system instead. Alternatively, EPA could raise the value to at least 110 percent to account fully for gasoline demand growth from 1998 to 2003. **(Sunoco, Inc. (IV-D-73), p. 12-13)** Two others believe this value is arbitrary. In current antidumping programs, new volume is considered any volume above 100 percent. Suggests using 100 percent for this program as well (i.e. any volume over 100% would accrue credits relative to the established standard threshold -- 150 ppm as proposed by EPA). Also, one commenter notes that this provision should apply on a refinery, not refiner, basis. **(American Petroleum Institute (IV-D-114), p. 10, Phillips Petroleum Company (IV-D-82), p. A13)**

**RESPONSE:** We proposed to limit the use of the refinery's sulfur baseline to 105% of the volume of gasoline produced in 1997-98, with any incremental volume held to a "baseline" of 150 ppm. In effect, for refineries producing in excess of 105% of their 97-98 production, this would have lowered their overall baseline from which credits were generated. Combined with the trigger for credit generation, this proposal limited the number of credits that could be generated. Since we have not adopted the 150 ppm trigger in favor of a more modest trigger tied to the refinery sulfur baseline, and since we want to encourage sulfur reductions even if capital investment does not occur, we have not adopted this volume provision. The only situation where we have maintained a baseline volume restriction is in the context of the gasoline that small refiners produce under the alternate small refiner standards. See preamble Section IV.C.2 for more information on this subject.

**COMMENT P:** The maximum amount of credits that can be generated should be limited to 100 ppm per gallon at each refinery. This approach limits the ability of refineries with high baselines from obtaining too many credits at the disadvantage of low sulfur baseline refineries that cannot achieve the same degree of reductions, and can achieve any reductions only through costly capital expenditures (as opposed to the low cost operational opportunities for high baseline refineries). **(Tosco Corp. (IV-D-111), p. 5-6)**

**RESPONSE:** We believe the sulfur ABT program will not allow the industry to spread out investments over several years unless refiners have certainty that some credits will be available to them. We have concluded that the best way to ensure sufficient credits is to allow credit generation for all but the most modest reductions in sulfur levels. Whether the reduction occurs because a high sulfur refinery makes a large reduction in average sulfur levels by installing new equipment or because a lower sulfur refinery makes process changes resulting in sulfur reductions, overall sulfur levels will be reduced. The benefits to vehicles in the existing fleet will still be realized, and thus the environmental benefits will

occur. Limiting credits based on a refinery's sulfur baseline or current sulfur levels would jeopardize the viability of the ABT program and would likely result in higher overall costs for gasoline sulfur control (since many more refineries would be forced to make investments by 2004 or 2005 than we project will occur). Thus, rather than disadvantaging refiners with lower baselines, the ABT program structure may enable them to delay significant capital investments by allowing them to generate (or purchase) credits towards compliance in the early years of the program without incurring significant costs.

**COMMENT R:** One commenter agrees that refiners should have the option to aggregate their gasoline sulfur baselines and their compliance with the gasoline sulfur average and cap between two or more refineries, but believes this approach should apply for all refineries in which a refiner has at least a 51 percent ownership stake (rather than the 100 percent requirement used under the RFG/anti-dumping programs). **(Ergon, Inc. (IV-D-157), p. 12-13)**

**RESPONSE:** Since generation and use of sulfur credits is on a individual refinery basis, it would not be appropriate to permit corporate averaging or aggregation of refineries in the context of generating credits under the sulfur ABT program. Allowing such aggregation would essentially transform the refinery average standard into a corporate average standard, which is a separate requirement under today's rule. Aggregation of the volume-weighted averages of multiple refineries owned by one refiner is required for purposes of compliance with the corporate average standards in 2004 and 2005. Refineries owned by a joint venture of multiple refiners can be averaged to determine the joint venture's compliance with the corporate average standards, or can be averaged with one of the individual refiner's other refineries in determining that party's compliance with the corporate average standard. The per-gallon caps are absolute and cannot be met on an average or aggregated basis.

### **Issue 17.3: ABT Timing and Averages/Caps**

**COMMENTS A, B and C:** Several commenters argue that due to the logistical limitations inherent in constructing new refinery process units, the timing is such that few, if any, credits will be generated. (**American Petroleum Institute (IV-D-114), p. 8, Marathon Ashland Petroleum LLC (IV-D-81), p. 21, Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Williams Companies, Inc. (IV-D-53), p. 4**) One commenter suggests that EPA is mistaken in believing that many refiners will make commitments to new technology for the desulfurization of gasoline before a final rule has been signed. Indeed, there are economic incentives to delay, rather than accelerate, investment decisions. (**U.S. Department of Energy (IV-D-121), p. 5**)

In the view of several commenters, the initial ABT program period should be spread out over eight years to allow for commercialization and validation of the newer technologies, thus affording refiners with multiple refineries the opportunity to choose to build the first advanced technology unit early and then apply the lessons learned from 1-2 years of operating experience to the design of the next units. (**American Petroleum Institute (IV-D-114), p. 8, Chevron Products Company (IV-D-62), p. 3, Citgo Petroleum Corp. (IV-D-126), p. 2, Marathon Ashland Petroleum LLC (IV-D-81), p. 21**)

One commenter argues that EPA should ensure that the ABT program allows refiners (particularly small refiners) adequate time to select and implement new technologies and that an adequate number of early credits will be available to those refiners that will install desulfurization technology in 2005. (**Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256)**)

**RESPONSE:** As explained in responses to Issues 17.1 & 17.2, we have considered the comments received on the sulfur ABT program and have made changes to the program to address these concerns. As explained in the Regulatory Impact Analysis, we have also gathered additional data on the status of new gasoline desulfurization technologies and have evaluated the likely actions that each refinery in the country will take to meet the standards in 2004 and beyond. Furthermore, we have spoken on a confidential basis with many refiners about their corporate plans to comply with the program's requirements. Based on all of this information, we believe the sulfur ABT program we have finalized is in fact workable and will allow some refineries to generate credits (whether or not they install capital equipment to do so) while allowing other refineries to delay investments, spreading the investments of the entire industry over at least six years (with credit generation beginning in 2000). As the analysis in the RIA shows, this schedule prevents the need for a large fraction of refineries to make investments in any one year, which will help to address many of the concerns raised by the commenters. We believe this approach provides adequate time for the new technologies to be commercially demonstrated so that operating data can be collected and evaluated by the vendors and by other refiners. Some refiners have already made plans and initiated the design and construction work needed to generate early credits and/or comply with the standards as early as 2004. Overall, our analysis shows that adequate credits will be generated to enable this orderly transition to low sulfur gasoline. Combined with our geographic phase-in and our small refiner provisions (which extend the total time for compliance for all refiners to 7-8 years) we believe our program provides sufficient time for the industry.

**COMMENT D:** According to numerous commenters the averages and caps are too low, and multiple steps for the averages/caps are unnecessary. A 120/90 ppm average in 2004/2005 with a 180 ppm cap is too restrictive to enable effective trading. Commenters suggest eliminating the corporate averages, and maintaining the 300 ppm cap until 2005 or 2007.

One commenter added that enforcement of the cap downstream should recognize the impact of the full ASTM reproducibility of the required test method on the compliance level. Questions from a congressional subcommittee also suggested removal of the corporate averages. **(American Petroleum Institute (IV-D-114), p. 9, BP Amoco (IV-D-58), p. 3-4, BP Amoco (IV-F-74), Citgo Petroleum Corp. (IV-D-126), p. 2, Fina Oil and Chemical Company (IV-D-152), p. 3-4, Koch Petroleum Group, LP (IV-D-72), p. 20, Marathon Ashland Petroleum LLC (IV-D-81), p. 22 National Petrochemical and Refiners Association (IV-D-118), p. 2, 16, 68, Phillips Petroleum Company (IV-D-82), p. A14, Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256))**

One commenter argued that the appropriate restraint for catalyst poisoning is a per gallon cap not a corporate average. The corporate average limits appear to be designed solely to limit the number of credits generated. At the same time these limits could disrupt supply for areas served by a single refinery or small group of refineries that are not part of a large corporation. **(Koch Petroleum Group, LP (IV-D-72), p. 20)** Also, multiple steps have no value for the ABT program. The ABT program should comprise only two steps: (1) to reach a target sulfur level on paper using early generated credits and (2) to reach the ultimate average sulfur level goal in the final compliance year. **(American Petroleum Institute (IV-D-114), p. 9, Marathon Ashland Petroleum LLC (IV-D-81))**

One oil company suggests only a single interim 150/300 ppm average/cap requirement if EPA believes an average requirement is needed. These levels have support in a broad range of the refining industry and are maintainable with commercially proven process changes and technology (such as undercutting heavy ends to the diesel pool, shifting to sweeter crudes, increasing hydrotreating severity and using oxygenates as diluents). This approach would allow refiners to preserve options for using more cost-effective, new technologies to meet the final 30/80 ppm levels. Reduced averages/caps in the interim would eliminate many of these options and require refiners to invest immediately in severe desulfurization using current technologies. In addition, octane loss will be a larger problem because of the severe hydrotreating required. The company also notes that this approach is similar to the two-step program Canada is considering, although the timeline in Canada is reduced given the advanced status of their rules, the reduced number of refineries, the reduced permitting lead time required, and the fact that Canadian refineries are not currently attempting to address year 2000 RFG/antidumping requirements or future diesel controls. **(Phillips Petroleum Company (IV-D-82), p. A 6-7, A14)** Finally, one commenter recommends that the corporate average be maintained at 150 ppm until 2008, with an individual refinery requirement of 30 ppm average with credits. **(Equiva Services LLC (IV-D-168))**

**RESPONSE:** While we did finalize a single per-gallon cap standard of 300 ppm for 2004 and 2005, we disagree with the comments which suggest that the corporate average standards, with a step-down between 2004 and 2005, are unnecessary. Together with the per-gallon cap, corporate pool average standards (and the refinery average standard which takes effect in 2005) will ensure that gasoline sulfur levels begin to decline no later than 2004. Compliance with these average standards will ensure that a significant portion of the national gasoline pool will have lower sulfur content compared to current levels, since all gasoline cannot be at 300 ppm and still meet the average standards. We have concluded that the environmental benefits of the Tier 2/gasoline sulfur program can only be achieved if gasoline sulfur levels decline in 2004 and 2005, even if individual batches of gasoline are allowed to meet somewhat higher sulfur levels. While some Tier 2 vehicles may see some gasoline that is at or near 300 ppm in the early years of the program, the impact will be relatively minor in light of the overall program benefits, since Tier 2 vehicles will constitute a fairly small portion of the total vehicle fleet in 2004-05.

We drew these conclusions independently of the decision to have a sulfur ABT program.

The sulfur ABT program, which enables inter-company trading around the corporate average standards and allows some refineries to delay compliance with the 30 ppm refinery average standard while encouraging other refineries to reduce sulfur levels prior to 2004, was designed solely to provide compliance flexibility for the industry. The caps and corporate averages are separate standards which serve to reduce the overall sulfur levels of the gasoline pool quickly as Tier 2 vehicles are introduced.

Our responses to comments about the downstream standards can be found in Issue 21.

**COMMENT E:** EPA should consider establishing a cap that refineries must meet regardless of the number of allowances or credits that are held by the refiner. **(Clean Air Conservancy (IV-F-75))**

**RESPONSE:** Consistent with the proposal, the per-gallon caps apply to all gasoline, regardless of the degree to which the refinery which produces it is using sulfur ABT credits to meet the refinery average standard or the degree to which the refiner is averaging and trading to meet the corporate average standard.

**COMMENT F:** Recommends that the banking end date be 2006 rather than 2004 to be consistent with the time line for corporate averaging. **(Cenex Harvest States (IV-D-131), p. 4)**

**RESPONSE:** The corporate averaging program we have finalized (which permits inter-company trading and allows allotments to be generated in 2003 for later use) does permit banking as well as trading of allotments. However, if carried over to the next year, the allotments are discounted at a 50% rate to maintain the environmental benefits of the program. Allotments that are not used in 2005 may be converted to credits for application to compliance with the 30 ppm refinery average standard, albeit at a discounted rate. The credits generated under the ABT program may be used to comply with the 30 ppm individual refinery average standard in 2005 and beyond (or with small refiner average standards). Credits generated prior to 2004 can be banked and used through 2006, at which point they expire. Credits generated in 2004 or later have a limited life of five years from the time they were generated, but the banking and trading program continues indefinitely.

**COMMENTS G and H:** One commenter states that Corporate Pool Average should be calculated using all of the gasoline supplied outside California (including imported and domestic gasoline) without consideration of new state programs. **(Equiva Services LLC (IV-D-168))**

Another argues that corporate pool averages should be allowed for importers, and, for companies that are refiners/blenders and importers, these averages should include both imports and refinery production. **(Sutherland, Asbill, & Brennan LLP (IV-D-225))**

**RESPONSE:** Both refinery averages and corporate averages are calculated based on all gasoline produced at that refinery (or by that refiner), excluding gasoline produced for sale in the state of California and gasoline exported from the U.S., but including gasoline produced for sale in other states with sulfur requirements. Companies that are both refiners/blenders and importers must include both gasoline produced and imported for sale in the U.S. in calculating their corporate averages. This was our intent in the proposal, and we have clarified these points in our final regulations.



#### **Issue 17.4: ABT Procedural Issues**

**COMMENT A:** Commenters argue that the credit seller who has insufficient credits to cover his or her sale should be required to purchase these credits. EPA should hold the credit buyer immune. (**American Petroleum Institute (IV-D-114), p. 10, Fina Oil and Chemical Company (IV-D-152), p. 6, Marathon Ashland Petroleum LLC (IV-D-81), p. 23, National Petrochemical and Refiners Association (IV-D-118), p. 65**) As another commenter notes, if EPA continues to hold the buyer potentially liable, EPA should ensure that the seller first uses its credits to satisfy the credit sale before using any of its credits for its own shortfall. (**Koch Petroleum Group, LP (IV-D-72), p. 22**) According to another commenter, to discourage improper selling of credits, EPA should make the seller account for double the amount of credits actually sold. (**Pennzoil-Quaker State Co. (IV-D-128)**)

**RESPONSE:** Consistent with our other fuel programs, we proposed and have finalized requirements for trades within the ABT program that are intended to ensure that only real credits are traded, and that a refinery not trade credits needed for compliance by that refinery. To ensure that refineries do not sell credits prematurely (before ensuring compliance), we have limited the trading of sulfur credits until after the end of the compliance period in which the sulfur credits are generated. (Note that this is different than sulfur allotments, which can be traded any time prior to or during the compliance year, because sulfur allotments are known at the start of the year if the refiner knows with reasonable accuracy his gasoline volume for the year.) We do not believe it is appropriate to allow a good faith purchaser to use invalid credits. Such purchasers have the remedies of contract against seller. We believe it is important that the rule maintains an incentive for the credit purchaser to beware of sellers. If invalid credits become valid when sold to another refiner there is great potential for abuse. We experienced such abuses during the leaded gasoline phase-down process, and want to avoid such problems in the gasoline sulfur phase-out. We believe the penalties for noncompliance, including both fines and possible legal action, are sufficient to discourage inappropriate credit generation and trading, so increasing the liability for the trading of invalid credits is unnecessary.

**COMMENT B:** The banking program should have quarterly or semiannual credit accounting to provide an incentive for generating credits later in a calendar year, at least in the initial year. (**Fina Oil and Chemical Company (IV-D-152), p. 5, Sunoco, Inc. (IV-D-73), p. 17**)

**RESPONSE:** We believe the changes we have made to the sulfur ABT program, such as the change in the baseline approval process and trigger values, provide adequate incentive for refiners to make early sulfur reductions. Thus, we don't think more frequent accounting is needed as an incentive. We are particularly concerned with the annual average sulfur levels and thus have finalized reporting requirements on an annual basis. While tracking credit generation on a more frequent basis could provide useful information to refiners seeking credits, ultimately the refinery's credit generation for a given year would be based on annual performance.

**COMMENT C:** Refiners should be able to purchase credits from one another regardless of refiner or refinery size. (**American Petroleum Institute (IV-D-114), p. 7, Fina Oil and Chemical Company (IV-D-152), p. 6, National Petrochemical and Refiners Association (IV-D-118), p. 65**)

**RESPONSE:** We proposed no restrictions on which refinery or refiner another refinery can purchase credits from, and have finalized no such restrictions. There are limited restrictions on credit generation for certain parties, but any refinery that needs credits to comply with the

30 ppm standard in 2005 and beyond can purchase those credits from any party that has valid credits to sell. While we did propose that small refiners could generate and sell credits, but not use them towards compliance with their interim average standards, the final rule permits small refiners to use credits as well.

**COMMENTS D, E, F and K:** Credits generated should not expire (or should last at least 10 years). This will provide a strong incentive for early compliance. **(Fina Oil and Chemical Company (IV-D-152), p. 6, Giant Industries, Inc. (IV-D-66), p. 3)** One commenter suggested this option only for program credits generated after the early credit period. Early credits should continue to expire on the timeframe proposed by EPA. This approach would also remove the need for long record retention periods for credit transfers. **(Koch Petroleum Group, LP (IV-D-72), p. 17, 32-33)** Another argues that the life of the credits should be extended providing the type of transition time that is similar to the phase-in of lower emission vehicles. **(BP Amoco (IV-F-74))**

A petroleum industry commenter suggested that credits should expire relatively quickly so that refiners have an incentive to market the credits quickly, while another stated that a preferred option would be to provide an incentive for companies to market their credits by providing that credits sold for external use be given twice the value as credits used for internal use. This would provide large refiners with a strong incentive to market credits to smaller refiners. **(Chevron Products Company (IV-D-62), p. 3, Pennzoil-Quaker State Co. (IV-D-128))**

Finally, one commenter suggested a 5-year credit shelf life, regardless of how generated and whether used or transferred. **(Environmental Defense Fund (IV-D-174), p. 12)**

**RESPONSE:** All of these comments address the question of credit life. Some support a long or indefinite credit life as an incentive to generate credits, and others support a short credit life as an incentive to market credits. As we discussed in the proposal and in the final preamble, we believe that it is important to limit credit life since the environmental impacts of shifting sulfur levels increase over time (as more and more Tier 2 vehicles enter the marketplace). Furthermore, the value of the credits will be greatest in the first years of the program when they will enable some refineries to delay construction of the equipment needed to get to 30 ppm. If credits had an infinite life, some refiners may see this as an incentive for hoarding credits, thus depriving other parties of needed credits during the very years when the industry as a whole most needs access to credits to make the implementation smooth. Thus, there seems to be little incentive for refineries to hold on to credits for long periods of time, because the value of those credits is likely to decrease as there will be fewer buyers seeking credits. In the later years of the program, when all refineries must meet the 30 ppm average, we anticipate only infrequent use of credits to address unexpected refinery upsets. However, even in those cases the market for credits will be limited since all gasoline will have to meet the 80 ppm cap. Finally, with sales of refineries and industry mergers, tracking credits with long lives will become increasing difficult with time, opening the door for inappropriate use of credits. Hence, we have finalized limitations on credit life similar to those proposed, except that credits generated in 2004 and beyond will expire five years from generation, regardless of whether or not they are traded to another party.

**COMMENT G:** If a refinery that has created credits is shut down after the initial early credit year, the refiner should be able to sell the previously banked credits or transfer the credits to another refinery within the company. **(National Petrochemical and Refiners Association (IV-D-118), p. 65)**

**RESPONSE:** Once generated, credits remain viable for sale for the specified life (through 2006 for credits generated early, five years after generation for credits generated in 2004 and beyond). If the refiner goes out of business, the credits die with the refiner. Difficult issues regarding accountability could arise if a credits from a refiner no longer in business were to be allowed to be sold. This should cause no hardship, because the refiner should be able to sell all its valid credits before going out of business. If they own multiple refineries and are only closing the one that generated credits, the refiner can transfer the credits to another refinery or trade to another company since the concerns about accountability would no longer hold true if the company remains in business.

**COMMENT H:** If a refinery generates early credits in one year, it should not be obligated or required to generate early credits in each and every succeeding year in the early credit generation period (no negative credits in 2000-2003 timeframe). **(American Petroleum Institute (IV-D-114), p. 10, National Petrochemical and Refiners Association (IV-D-118), p. 66, Phillips Petroleum Company (IV-D-82), p. A12)**

**RESPONSE:** We did not propose and have not finalized any such provision. Refineries are eligible to generate credits in any year they meet the requirements, and do not have to continue to generate credits in subsequent years (as long as they meet the applicable standards in 2004 and beyond).

**COMMENT I:** During the early credit period, a refinery should not be able to transfer or sell credits in excess of what the refinery has banked. **(American Petroleum Institute (IV-D-114), p. 7, National Petrochemical and Refiners Association (IV-D-118), p. 64)**

**RESPONSE:** We agree with this comment and the regulations reflect this position. Credits that don't exist cannot be sold, transferred or used.

**COMMENTS J and M:** Some commenters support allowing refiners/importers to carry negative credit balances for more than one year. **(Fina Oil and Chemical Company (IV-D-72), p. 6, Koch Petroleum Group, LP (IV-D-72), p. 23)** Another opposes allowing refiners/importers to carry negative credit balances from one year to the next because it will delay action to reduce overall sulfur levels and sufficient flexibility is already provided. **(International Center for Technology Assessment (IV-D-122), p. 9)**

**RESPONSE:** Some commenters recommended allowing refiners to carry over negative credit balances from one year to the next, while another commenter opposed it. We strongly disagree with the commenters who recommended allowing such carryover. The program becomes unenforceable if, no matter how out of compliance a refiner is and no matter how long this goes on, there is no violation because of an ability to eventually balance the deficit at some later date. Further, if a refiner gets too far out of compliance it may have a hard time buying enough credits to achieve compliance. Because of the environmental implications of allowing noncompliance for even one year (particularly in 2006 and beyond when the number of Tier 2 vehicles in the fleet will increase substantially and thus the loss of emissions performance upon exposure to higher than specified sulfur levels is most harmful), we do not believe it would be appropriate to allow a refiner to carry a deficit for more than one year.

Even with the rule's provision that a refiner can be out of compliance with the averaged standard for one year, as long as it balances that deficit in the next year, we want to clarify that the deficit that may occur in any one year cannot exist due in any part to the transfer of

credits that it needed to meet the standard. Any deficit that exists must exist only because the refiner has not met the standard despite any purchase of credits. Any refiner in deficit cannot sell credits. Nor can it sell credits if those credits were needed to achieve compliance.

**COMMENT L:** Supports the concept that credits generated at below 30 ppm would be banked at a rate of 1.5 to 2.0 per credit generated. **(Cenex Harvest States (IV-D-131), p. 4)**

**RESPONSE:** We have not adopted this suggestion, because we believe our revised ABT program will provide sufficient credits to allow refineries to comply with the standards even in the event of unanticipated construction delays. Prior to 2004, credit generation is relative to the refinery's individual sulfur baseline level. A refinery producing gasoline averaging less than 30 ppm in those years will generate a large number of credits, even if the baseline sulfur level is relatively low. In 2004 and beyond, credits are generated only for reductions below a 30 ppm annual average (for most refineries; different requirements apply for credit generation by small refiners and gasoline produced for the geographic phase-in area in 2004 and beyond). Refineries must begin meeting the 30 ppm refinery standard in 2005. While inflating the value of credits generated for reductions below 30 ppm in these years would provide an additional incentive for refiners to go even lower, the market value of those credits would probably be less than expected because the number of refiners using credits to meet the 30 ppm standard will decrease dramatically in 2006 and later. The 80 ppm cap will limit the number of credits that can be used, and the vast majority of refiners will have installed equipment capable of meeting the 30 ppm average in their design to comply with the 80 ppm cap.

**COMMENT N:** EPA should assure that the size of sulfur credits is conveniently sized, such as 100,000 ppm-Bbl per credit. **(Fina Oil and Chemical Company (IV-D-152), p. 6)**

**RESPONSE:** While we can appreciate the convenience of using simplified units of credits, in the manner suggested by this comment, we see no need to limit credit generation and use in this way. We expect no difficulties for refiners to track credits based on the actual volume of gasoline produced in a given year, expressed in annual gallons.

**COMMENT O:** Areas of the country that are not required to reach 30 ppm or even 150 ppm during the designated time period should have the option to petition EPA to allow sulfur credits to be applied to the sulfur cap as well as the standard. Limits such as a 300 ppm terminal average with a 450 ppm cap could be used to avoid extreme situations. **(Fina Oil and Chemical Company (IV-D-152), p. 5)**

**RESPONSE:** In 2004-2005, even with our small refiner provisions and geographic phase-in, there will not be areas of the country which have significantly different requirements than other areas of the country because the caps are identical under all parts of the program, except for the very small number of small refiners who may be assigned the highest standards. Corporate average standards will vary somewhat in 2005 for those refiners who participate in the geographic phase-in in the West, but the areas which will average around 150 ppm rather than 90 ppm will be relatively small (in terms of market size). In 2006-2007, when the geographic phase-in and small refiner standards continue, there is some chance that Western markets will have higher sulfur levels than other parts of the country. The degree to which this happens depends on how many refiners participate in the geographic phase-in and how many of these delay compliance with the 30ppm/80ppm standards for the full time period. (There is no reason why a refiner participating in the geographic phase-in

could not reduce sulfur levels partially or fully in advance of 2007.) These caps and corporate averages are necessary to protect the Tier 2 vehicles as they are introduced and to push sulfur levels down as quickly as possible as the industry moves to the 80 ppm cap/30 ppm average standards. While the downstream caps which apply at terminals and retail stations help to ensure that vehicles are protected, the bulk of the burden for producing compliant gasoline must be put on the refiners, not downstream parties.

#### **Issue 17.5: Importers/Small Refiners ABT Issues**

**COMMENTS A and E:** Small refiners should not be allowed to use both the extended compliance schedule and the ABT program. According to some commenters, this dual benefit would provide them with further advantage over larger refineries because they could earn and sell credits for early reductions in 2000-2003 and then sell high-sulfur gasoline into a premium low-sulfur market in 2004-2007 (even though they could not use the credits to meet their own more lenient standards). (**Independent Refiners Coalition (IV-D-120), p. 6, Sunoco, Inc. (IV-D-73), p. 15, Tosco Corp. (IV-D-111), p. 4**)

However, one commenter believes EPA should allow small refiners to opt out of the small refiner provisions if they believe the ABT provisions are more beneficial. (**Giant Industries, Inc. (IV-D-66), p. 4**) Another commenter believes EPA should allow refiners that qualify for the small refiner relief provisions to participate in the ABT program as well. (**State of Wisconsin (IV-D-166)**)

**RESPONSE:** EPA received comments supporting and comments opposing allowing small refiners to use ABT credits towards meeting their interim average standards. Based upon consideration of the comments received on the proposal, we believe that refiners complying under the small refiner provisions should be permitted to use sulfur credits to meet the average standard applicable to their refineries and to generate and sell credits, if they are able to do so. We proposed to prohibit small refiners from using credits to meet the small refiner standards because the small refiner standards are generally more lenient than the 30 ppm standard. However, several small refiners who already produce very clean gasoline commented that the special small refiner standards do not benefit them in any way. These refiners argued that if they could generate sufficient sulfur credits in 2000-2003, or could purchase such credits from other refiners (to meet the 30 ppm average and the corporate averages of 120 ppm in 2004 and 90 ppm in 2005) they would participate in the sulfur ABT program instead of the small refiner program. But since they are not positioned to generate credits, and have little certainty of being able to purchase credits, they need the relief provided by the small refiner provisions. We concur with these concerns and thus permit small refiners to use ABT credits. Small refiners may only use ABT credits to comply with their refinery average standard, not the per-gallon caps applied to their gasoline. Furthermore, a small refiner may opt-out of the small refiner program if at any time they find that compliance with the standards applicable to non-small refiners is preferable. Regarding letting small refiners generate credits for reductions prior to 2004, we believe that any sulfur reductions should be encouraged (as our justification for the ABT program reflects) and see no need to limit this to large refiners. However, if small refiners do generate early credits, their sulfur baseline will be adjusted downwards to reflect their new operating capabilities, which could impact the standards the refinery is held to in 2004 and beyond.

**COMMENT B:** The proposed ABT program will provide foreign refiners with a competitive advantage over domestic refiners by allowing them to manipulate blendstocks sold into the U.S. (**Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Marathon Ashland Petroleum LLC (IV-D-81), p. 22, Senate Hearing Materials (IV-D-229), Marathon statement, p. 4**) (See other letters listed under Comments B.1 and B.2 that follow.)

**RESPONSE:** One commenter said that, whatever banking and trading program the Agency ultimately adopts, the program must include adequate enforcement mechanisms to prevent undesirable consequences such as bogus credit generation by foreign refiners. We believe that the enforcement provisions of the sulfur rule are sufficient to prevent such undesirable consequences. The final rule imposes various requirements on foreign refiners who participate in the ABT program not required of domestic refiners, including the requirement

to post bonds. Similar provisions have been implemented under the RFG/CG program and we believe those provisions have been effective. Other commenters provided more detailed comment on this issue. Their comments are summarized below. See also our responses to Issue 22.B, including Issue 22.B.2.

**COMMENT B.1:** Several commenters argue that EPA needs to base foreign sulfur baselines and sulfur reductions on total refinery production, while basing the volume of the credit earned on actual imports. **(Independent Refiners Coalition (IV-D-120), p. 4-5, Sunoco, Inc. (IV-D-73), p. 14, Tosco Corp. (IV-D-111), p. 4)**

**RESPONSE:** EPA's sulfur control program is not aimed at regulating the quality of gasoline used in other countries, nor at regulating foreign refiners except with regard to the gasoline they send to the U.S. Reductions in gasoline sulfur in U.S. gasoline are what is relevant to achieving the intended environmental benefits and enabling vehicle emissions control technology. As a result, we believe it is appropriate to base foreign refiner sulfur baselines and reductions, as well as credit generation, on actual imports to the U.S. The final rule clarifies the ABT provisions to implement this approach.

**COMMENT B.2:** Some commenters believe foreign refiners should not have the option of using their own baseline or the baseline of the importer. Domestic refiners do not have this type of option. At the least, EPA should limit this option to a one-time election. **(Independent Refiners Coalition (IV-D-120), p. 5-6, Sunoco, Inc. (IV-D-73), p. 14-15, Tosco Corp. (IV-D-111), p. 4-5)**

**RESPONSE:** As discussed in Preamble section IV.C.1, the final rule provides that early credits for imported gasoline may be generated only by foreign refiners who establish an individual sulfur baseline. Early credits may not be generated by importers. Thus, foreign refiners will not have the alternative of using either their own baseline or the baseline of the importer. Beginning in 2004, credits for imported gasoline will not be based on individual baselines, and they may be generated only by the importer, who is the regulated party from that point forward.

**COMMENT C:** EPA should clarify that credits will be calculated based upon the average sulfur content of all imports. **(Sutherland, Asbill, & Brennan LLP (IV-D-225))**

**RESPONSE:** The final rule clarifies that credits generated by the importer in 2004 or later are based on the average sulfur content of all gasoline imported by the importer during the averaging period.

**COMMENT D:** EPA should allow importers which are also refiners or refiner/blenders to calculate a single pool of credits. **(Sutherland, Asbill, & Brennan LLP (IV-D-225))**

**RESPONSE:** We disagree, because compliance with the sulfur standards will be met and reported separately for imported gasoline and gasoline produced at each refinery. As a result, credit generation will also be based separately on reductions achieved at each refinery, or, in the case of an importer, all gasoline imported during the averaging period. We believe that the most efficient way to track credit activity is to include credit information in the refiner's annual averaging report for each refinery and the importer's annual averaging report.

Regarding corporate pool averages, the final rule clarifies that importers are subject to the corporate pool average standards for all of their imported gasoline during the compliance period. For importers that also have refinery (or blending) facilities, the corporate pool average would include both imports and refinery production. The final rule clarifies this as well.



#### **Issue 17.6: Other ABT Issues**

**COMMENT A:** Provision should be made in the ABT program for shutdowns, turnovers, turnarounds, and upsets because the 80 ppm cap may be too restrictive to cover these situations. [See also Comment 26.2.2.G.1] (**Ergon, Inc. (IV-D-157), p. 9-10, Koch Petroleum Group, LP (IV-D-72), p. 21**) One commenter argues that EPA should consider expanding the ABT program to allow each refiner a set number of days per year to handle downtime without having to adhere to the sulfur cap. This would help address any compliance problems refiners may encounter during scheduled maintenance or other unscheduled downtime (see also Comment 23.2.2.F and Comment 26.2.2.G on this concern). (**Citgo Petroleum Corporation (IV-F-33)**) Another commenter suggests that another means of partially addressing this concern would be to remove the blendstock accounting provisions of antidumping to provide at least a modest addition of flexibility. (**American Petroleum Institute (IV-D-114), p. 10, Marathon Ashland Petroleum LLC (IV-D-81), p. 23**)

**RESPONSE:** We do not agree to eliminate the provisions of 40 CFR § 80.102 (Controls applicable to blendstocks) at this time or to adopt a substitute provision. For as long as the gasoline anti-dumping rules or the gasoline sulfur rules allow some refiners a less stringent standard, there will be a concern that refiners subject to a more stringent standard will transfer dirty blendstocks to a refiner with a less stringent standard for the purpose of avoiding the more stringent standard. However, if unanticipated problems arise, EPA will further consider this issue subsequent to this rulemaking. EPA would consider an alternative to § 80.102 that might allow special provision for blendstock transfers that can be shown to be necessitated by turnarounds or upsets. However, in discussing this issue in the past, no alternatives to § 80.102 have been found that address the concern of preventing blendstock transfers that are done to avoid meeting a more stringent standard. See our response to Comment 26.2.2.G.1 for additional thoughts on accommodating refinery shutdowns, turnarounds, etc.

**COMMENT B:** EPA should ensure that the costs of the ABT program are minimized by building on the experience of other successful trading programs such as the program designed to address SO<sub>2</sub> and acid rain concerns. (**BP Amoco (IV-F-74)**)

**RESPONSE:** While there are substantial differences between the acid rain trading program and our gasoline sulfur ABT program, we did consider our experience in that program as well as trading that has been allowed in other fuel programs in designing our program. We believe we've designed a program that is both workable and enforceable, one that provides flexibility while helping to prevent the invalid generation or use of credits. Overall, since the recordkeeping and reporting requirements for the ABT program expand only slightly the existing requirements (or, the requirements that would take effect when the 2004 standards begin in the absence of an ABT program), we believe the costs of this program are kept to a minimum.

**COMMENT C:** EPA should give the same types of credits to refiners that introduce low sulfur diesel fuel (as compared to credits for low sulfur gasoline), setting the baseline at actual levels during the baseline year. (**Alliance of Automobile Manufacturers (IV-D-115), p. 143-144**)

**RESPONSE:** Since the vast majority of light-duty vehicles (including trucks) use gasoline, while the vast majority of diesel fuel is used for heavy-duty engines (which generate emissions that affect air quality differently than those generated by light-duty vehicles), it would not be appropriate at this time to allow diesel fuel sulfur reductions to generate credits

to offset needed gasoline sulfur reductions. As we consider the need to reduce diesel fuel sulfur levels, which will be discussed in an upcoming proposed rule, we will consider the usefulness of a sulfur credit trading program to enable and encourage diesel sulfur reductions.

**COMMENT D:** If EPA retains the 30 ppm average, EPA should consider removal of the NO<sub>x</sub> provision of antidumping. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 23)** One of these commenters believes this is consistent with EPA's removal of VOC and CO from the antidumping provisions based on the national use of low RVP and oxygenate, respectively. **(American Petroleum Institute (IV-D-114), p. 11)** Another commenter adds that summer and winter RFG NO<sub>x</sub> performance standards should be dropped. The only exceptions would be small refiners between 2004 and 2007. This would also mean dropping the RFG NO<sub>x</sub> retail compliance surveys; the small refiners do not produce a sufficient enough amount of the RFG to matter. **(National Petrochemical and Refiners Association (IV-D-118), p. 85)**

**RESPONSE:** We cannot take action on this issue without adequate notice and comment; a separate rulemaking would be required to do this. Since the gasoline sulfur rule, by dramatically reducing sulfur levels for most refineries, will actually make it easier for refiners to meet both the reformulated gasoline NO<sub>x</sub> standards and the anti-dumping NO<sub>x</sub> requirements, retaining the NO<sub>x</sub> standards does not appear to create an increased burden to the industry. However, while the gasoline sulfur program is phasing in, we do not believe it would be appropriate to eliminate the requirements for RFG NO<sub>x</sub> retail compliance surveys. We may reconsider this position in the future as we get closer to the point when all refiners are meeting the 30 ppm average standard.

**COMMENT E:** EPA should give extra credit for marketing fuels containing less than 5 ppm sulfur. **(Alliance of Automobile Manufacturers (IV-D-115), p. 143-144)**

**RESPONSE:** See our response to Issue 17.4.L.

**COMMENT F:** EPA should allow arbitrage in the credit trading system. A healthy market requires the participation of traders who provide economic efficiency through arbitrage. EPA has recognized the benefits of open trading in other CAA programs. These programs have not been abused. EPA can protect the sulfur trading program as well. By allowing arbitrage, EPA will more readily achieve its stated objectives. **(Sutherland, Asbill, & Brennan LLP (IV-D-225))**

**RESPONSE:** Our program allows free and open trading of ABT credits by the credit generator to the refinery that will use the credits. We will not broker or mediate these trades; the industry can use whatever marketplace mechanisms work best to make these trades happen. However, we do not allow third-party trading or credit brokers. While some EPA credit programs have permitted such arrangements (or outrightly provided for such arrangements), in past fuels programs we experienced a substantial number of instances of refiners or third parties trading inappropriate credits - in some instances, false credits. Based on that experience, we do not believe third parties should be involved because it is difficult to trace liability and the buyer of the inappropriate credits has no safeguards in such a situation.

## **ISSUE 18: RELIEF PROVISIONS FOR SMALL REFINERS**

### **Issue 18.1: Appropriateness of Small Refiner Provisions**

**COMMENTS A, B, AND H:** Many commenters support the proposal to provide relief for small refineries in the form of a delayed implementation schedule. United Refining estimates a \$30 million investment to comply with the proposed rule. Senator Specter supports United Refining's comments on the importance of the small refiner provisions. A commenter states that the level playing field concept urged by API is ridiculous given the huge disparities between the massive major oil companies and the small refiners. There is a broad public interest in preserving small refiners both for fuel supply reasons and to reduce the ability of the major oil companies to pass along all of the compliance costs to consumers.

Certain commenters specifically support an additional allowance of time for small refiners to comply with the proposed regulation. Small refiners need at least an additional six years (i.e., until 2010) in order to ensure the development and commercial proveout of emerging new technologies. If the promising technologies are not commercially viable at the end of that period, then small refiners should be given a correspondingly longer timeframe to operate under the interim standards. Commenter adds additional information and cites to SBARP and NPRA findings. Notes that small refineries have limited access to vendors and construction contractors if they need to compete with large refineries at the same time. Commenter also notes the general economies of scale involved for small refineries. Using conventional technology, EPA estimates the 30/80 gasoline sulfur standard would increase manufacturing costs 5.1 to 8 cents per gallon, or \$5.6 to 8.8 billion each year nationally. The cost to smaller refineries is disproportionately larger, increasing the risk of closure and unnecessarily higher consumer prices. Other commenters raise similar points to support the small refiner provisions. Another commenter suggests that small refiners should be given until 2008 to comply with the proposed standards. Finally, a state notes importance of one small refiner in portion of Wisconsin.

Commenters state that without the small refiner accommodations, many small refiners would go out of business. However, even more flexibility is required than EPA proposed. In the Rocky Mountain states, virtually no surplus refining capacity exists. Any refinery closures resulting from the implementation of the proposed sulfur regulations could reduce gasoline supplies and have a corresponding effect on price. Despite the provisions in the proposed rule for small and medium size refineries, there may be a number of these industries that are not able to comply with the lower sulfur requirements and may be forced to close. Another commenter raises similar concerns, and also recommends that at a minimum small refineries in attainment areas should be provided additional time to comply.

**Commenters:** Chevron Products Company (IV-D-62), p. 6-7, Conoco, Inc. (IV-F-120), Countrymark Cooperative, Inc. (IV-F-124), Countrymark Cooperative, Inc. (IV-D-154), p. 1-2, Ergon, Inc. (IV-D-157), p. 8, Fina Oil and Chemical Company (IV-D-270), p. 1-2, Flying J Inc. (IV-D-151), p. 2, 5, Frontier Oil Corporation (IV-F-47), Frontier Oil (Denver) (IV-F-133), Gary-Williams Energy Corporation (IV-F-41), Giant Industries, Inc. (IV-D-66), p. 3, McCrery, J. (US Rep.) (IV-D-179), Murphy Oil USA, Inc. (IV-D-4), p. 1-2, Murphy Oil USA, Inc. (IV-D-117), p. 9-12, Oregon Department of Environmental Quality (IV-F-57), Oregon (Office of the Governor) (IV-D-902), Peterson, J. (IV-D-254), Placid Refining Company, LLC (IV-F-69), Placid Refining Company, LLC (IV-F-91), Ports Petroleum Company, Inc., et. al. (IV-F-64), Regional Air Quality Council (IV-D-134), Sinclair Oil Corp. (IV-D-150), Ex. 1, p. 2, Specter, A. (US Senator) (IV-D-203), State of Wisconsin (IV-D-193), United Refining

**Company (IV-F-99), United Refining Company (IV-D-147), p. 4-5, Western Governors' Association (IV-D-20), Western Governors' Association (IV-D-100), Williams Companies, Inc. (IV-D-53), p. 3, Wisconsin Transportation Builders Association (IV-D-185)**

**RESPONSE:** Generally, these comments provide added justification and support for our small refiner provisions. As we explained in the preamble, we are convinced that small refiners, if not offered some respite, would be unable to meet the standards in the 2004 timeframe. Based on our discussions with small refiners prior to the SBREFA process, our experience in the process, and comments received on the proposal, we concluded that it would be an extreme hardship for small refiners to comply with the 30/80 standard in the same time frame as the larger refining companies.

As discussed in the preamble, we are revising the employee number criterion for qualification as a small business under this regulation. Specifically, we are modifying how the employee number is determined, based on comments received from SBA—we are incorporating that definition correctly in today's action. We have also adjusted the standards for small refiners that currently produce relatively clean gasoline, (i.e., small refiners that have baseline sulfur levels of zero to 80 ppm) to provide more flexibility to these refiners during the interim period of 2004-2006. Although we believe that these small refiners should be able to continue meeting these standards without much, if any, change to their operations, we are adjusting the cap to give these refiners at least the same flexibility provided to larger entities. Finally, as discussed in issue 17.5, above, we are now allowing the refineries owned by small refiners the opportunity to use sulfur credits and/or allotments to comply with their refinery average standards in 2004 through 2007. This provides significant additional flexibility to deal with turnaround, upsets, changes in crude slate, and other refinery changes which might increase sulfur levels. Thus we believe our small refiner provisions will minimize the likelihood that any refineries will close or cease gasoline production as a result of our gasoline sulfur program with the extended timeframe. 0

In regard to lead time, one commenter suggested that EPA provide six additional years (until 2010) for small refiners to comply with the 30 ppm average and 80 ppm cap standards. We believe that the lead time we are providing will be sufficient for all small refiners to make the necessary refinery modifications for producing low sulfur gasoline. However, for small refiners who face unanticipated problems in complying by 2008, we are adopting a provision which will allow small refiners to seek up to an additional two years to comply based on a showing of hardship circumstances. This provision addresses the commenter's concern that, if development and commercial proving of new technologies does not occur as expected, or if other currently unanticipated circumstances arise, some small refiners may need additional time.

**COMMENT C.1:** All refiners should meet the same standard at the same time, with no special treatment or waivers for small refiners. (20/20 Vision (IV-F-38), American Lung Association (Atlanta) (IV-F-132), American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of Northern Ohio (IV-F-110), BP Amoco (IV-D-58), p. 5-6, City of Boulder (IV-F-85), Fletcher, Robert E. (Atlanta) (IV-F-132), Frumpkin, Howard (Atlanta) (IV-F-132), GA House of Representatives (Atlanta) (IV-F-132), Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Mason, P. (IV-F-70), NJ Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Ozone Transport Commission (IV-D-112), p. 4, Senate Hearing Materials (IV-D-229), Marathon statement, p. 3, STAPPA/ALAPCO (IV-F-6), Sierra Club (IV-F-14), Sierra Club, Maryland Chapter (IV-F-53), Sierra Club, Pennsylvania Chapter (IV-F-37), Sunoco, Inc. (IV-D-73), p. 3-4, 16, Tennessee Environmental Council (Atlanta) (IV-F-132), Tosco Refining Company (IV-F-56), Trepal, C. (IV-F-109), Valero Energy Corporation (IV-F-78)) EPA is not required to provide special treatment to small refiners, and has, in fact, foregone providing such preferential treatment in other fuels programs. Any extended compliance period for small refiners also is wholly inconsistent with EPA's

position on sulfur reversibility. If current sulfur levels in fact do cause irreversible damage to the catalyst technologies that will be used for Tier 2 compliance, then no extended compliance period can be provided. **(American Petroleum Institute (IV-D-114), p. 131-132, Marathon Ashland Petroleum LLC (IV-D-81), p. 41) (See other letters listed under Comments C.2 through C.10 that follow.)**

**RESPONSE:** Although we are not required by the CAA to provide special treatment to small refiners, the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) requires us to carefully consider the economic impacts that our rules will have on small entities and balance that with the environmental benefits. Specifically, the RFA requires us to determine, to the extent feasible, our rule's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain our ultimate choice of regulatory approach. In our analysis of the cost and feasibility of compliance with the sulfur standards, we concluded that small refiners will, in general, need more time than large companies to comply, based on their unique circumstances. Rather than delaying the overall sulfur program to allow for concurrent compliance by all refiners, we have adopted less stringent interim standards for the small refiners. These standards will provide these refiners four additional years to comply with the 30 ppm refinery average and 80 ppm per gallon cap standards. However, significant reductions in sulfur levels for all gasoline will be required in the long-term.

Refiners have received flexibility before in regulatory actions. In the lead phase-down program for gasoline, for example, we used a definition of "small refinery" that Congress adopted in 1977 specifically for the lead phase-down program. The definition was based on crude oil or feedstock capacity at a particular refinery (less than or equal to 50,000 barrels per calendar day (bpcd)), combined with total crude oil or feed stock capacity of the refiner that owned the refinery (less than or equal to 137,500 bpcd). In 1990, the lead phase-down program was complete and Congress removed this provision from the Act.

Shortly before the Act was amended in 1990, we set standards for the sulfur content of on-highway diesel fuel, including a two-year delay for small refineries. We used the same definition of small refinery as we used in the lead phase-down program. This two-year delay, like many of the small business flexibilities in our gasoline sulfur proposal, was aimed at problems that small refineries faced in raising capital and in arranging for refinery construction, and allowed the program to begin in the original timeframe.

In the 1990 amendments to the Clean Air Act, Congress rejected this small refinery provision, and instead allocated allowances to small diesel refineries under the Title IV Acid Rain program. (See CAA Section 410(h).) Congress provided allowances to small refineries that met criteria similar to that used in the lead phase-down provision – based on the crude oil throughput at a particular refinery, combined with the total crude oil throughput of the refiner that owned the refinery.

We believe that the small refiner flexibilities we have designed into the Tier 2 rule are reasonable. Furthermore, we do not believe they conflict with our overall goals of reducing gasoline sulfur levels 1) nationwide as soon as possible and 2) sufficiently to enable and protect the emissions performance of Tier 2 vehicles. Our conclusions are based, in part, on the fact that only a small volume of gasoline will be eligible for the less stringent small refiner standards. We have estimated that small refiners produce approximately four percent of all gasoline in the U.S. In most cases, gasoline produced by small refiners is mixed with substantial amounts of other gasoline prior to retail distribution (due to the nature of the gasoline distribution system). This mixing generally results in only marginal increases in overall sulfur levels on a per fueling basis. Thus, the sulfur level of gasoline actually used by Tier 2 vehicles should generally be much lower than that produced by

individual small refineries who receive unique compliance standards through 2007. In addition, the small refiner standards are only temporary, and will apply in the first four years of the program, before Tier 2 vehicles comprise a majority of the in-use vehicle fleet. Thus, while Tier 2 vehicles that use higher sulfur gasoline will experience sulfur sensitivity, as well as some irreversible sulfur effects, the emissions impact of this occurrence is fairly minimal because of the small volume of the national gasoline pool involved, as well as the relatively few Tier 2 vehicles that will be in the fleet in the early years of the program.

**COMMENTS C.2, C.5, C.6, F, AND G:** Two commenters state that, consistent with the agency's belief that the effects of sulfur on catalysts are irreversible, EPA should include provisions that discourage the use of the hardship exemption. The hardship provision should follow the design of section 80.73 of the Agency's RFG rule. In addition, EPA must include a provision allowing for an appropriate adjustment of the downstream standards, similar to the adjustment that applies during the first years of the program when the small refiner exemption is in effect.

Other commenters state that the implementation delay proposed for small refiners creates a downstream compliance complication for EPA and everyone in the system. The proposed Tier 2 rule undermines the foundations that have allowed industry to comply with the product transfer documentation (PTD) requirements. One commenter argues that changes in PTD documents will work counter to EPA's desire to ensure small refiner access to markets because the only apparent way for a company to remain in compliance with this proposed requirement is to avoid receiving small refiner gasoline. Another commenter states that the procedures for tracking downstream compliance based on PTDs is far too complex, would interfere with downstream oversight quality assurance programs involving outside parties testing at random locations and diminishes refiners' ability to defend against alleged liabilities for downstream violations. One commenter notes that because of these downstream compliance concerns, EPA should require refinery gate compliance only during the period in which the small refiner provisions are in effect.

Providing additional time for small refiners to phase in gasoline sulfur control will result in extending the time period during which Tier 2 vehicles may be subjected to catalyst poisoning from higher sulfur gasoline. One commenter notes that this situation causes further complication to assure fair treatment of manufacturers in in-use compliance testing programs. Another commenter argues that this provision could impact vehicle warranties. Finally, one commenter states that EPA should provide further justification for the extension provided to small refiners given the fact that higher sulfur levels will cause irreversible damage to catalysts.

One commenter also stated that small refiners should not be allowed the opportunity to delay implementation until 2010. Rather, a system of financial incentives should be used to help these refiners achieve lower sulfur levels.

**Commenters:** Alliance of Automobile Manufacturers (IV-D-115), p. 150, American Petroleum Institute (IV-D-114), p. 133, Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 5, Equiva Services LLC (IV-D-168), Exxon Company, USA (IV-D-119), p. 3, Koch Petroleum Group, LP (IV-D-72), p. 37, Marathon Ashland Petroleum LLC (IV-D-81), p. 42-43, Mobil Oil Corp. (IV-D-113), p. 3, Phillips Petroleum Company (IV-D-82), p. 2, A4, A8, A16, U.S. House Committee on Science (IV-D-253), p. 1

**RESPONSE:** Although, as discussed above, only a small fraction of gasoline will be afforded the more lenient small refiner standards from 2004 through 2007, we still recognize the need for downstream standards which account for the higher sulfur levels of the small refiner gasoline.

We believe that the standards we are finalizing for our downstream program will accommodate not only the higher sulfur levels of the small refiner gasoline but also the higher sulfur levels (i.e., higher than 30/80) of the gasoline produced by all refineries participating in the ABT program during 2004-2006 and the geographic phase-in program. By 2007, when 100 percent of light-duty vehicles and light light-duty trucks are meeting the Tier 2 emission standards, only a small fraction of gasoline will have sulfur levels higher than 30/80. During this time frame, the high sulfur gasoline produced by small refiners will be mixed with sufficient amounts of complying gasoline prior to retail distribution so that only marginal increases in overall sulfur levels will result. Because of this dilution effect, we don't not believe that there will be a problem with in-use compliance testing or vehicle warranties. Furthermore, by 2009 when all new vehicles are meeting the Tier 2 standards, essentially all gasoline will be meeting the 30/80 standards. **See also response to comment 21.A.**

As discussed in the preamble, we are offering three types of hardship extensions for qualifying refiners. First, small refiners can apply for a hardship extension which could potentially provide their small refinery(s) an additional two years to comply with the national standards. We believe that basic tenets of the hardship provision, coupled with our compliance plan requirements, will allow only the most challenged refineries to qualify for the two-year extension. Because plans and commitments must be made during 2004-06, potential hardship extensions should be evident beforehand.

Second, we are adopting a provision permitting refiners to seek a temporary waiver from the sulfur standards in certain circumstances. This provision is similar to a provision in EPA's RFG regulations, and is intended to provide refiners short-term relief in unanticipated circumstances such as an accidental refinery fire or a natural disaster. The short-term waiver provision is intended to address unanticipated circumstances that cannot be reasonably foreseen at this time or in the near future. The conditions of the waiver are necessary and appropriate to ensure that any waivers that are granted are limited in scope, and that refiners do not gain economic benefits from a waiver.

Finally, we are adopting a provision for relief based on extreme hardship circumstances. In developing our sulfur program, we considered whether any refiners would face particular difficulty in complying with the standards in the lead time provided. As described above and in Section IV.C.2 of the preamble, we concluded that refineries owned by small businesses would experience more difficulty in complying with the standards on time because, as a group, they have less ability to raise capital necessary for refinery investments, face proportionately higher costs because of economies of scale, and are less able to successfully compete for limited engineering and construction resources. However, it is possible that other refiners who do not meet our criteria for the interim standards also face particular difficulty in complying with the sulfur standards on time. Therefore, we are including in the final rule a provision allowing refiners (domestic and foreign) to request a limited amount of relief from the sulfur standards based on a showing of unusual circumstances that result in extreme hardship and significantly affect the ability to comply by the applicable date. We expect that any such extensions will be very constrained, perhaps limited to approximately one percent of national gasoline consumption, and that any such relief will require gasoline sulfur levels no less stringent than those for the SBREFA program. As with the small refiner interim standards, this provision furthers our overall environmental goals of achieving low sulfur gasoline nationwide as soon as possible. By providing short-term relief to those refiners that need additional time because they face extreme hardship circumstances, we can adopt a program that reduces gasoline sulfur beginning in 2004 for the majority of the industry that can comply by then.

During the SBREFA process and in the written comments, commenters also suggested an idea of a financial incentives system (for example, tax incentives) to help challenged

refiners meet the 30/80 standard. However, EPA does not have statutory authority to create tax incentives. The approach recommended by the commenter would require an Act of Congress to implement.

**COMMENTS C.3, C.4, C.7, C.8, C.9, D, E, AND I:** One commenter states that arguments used by the SBREFA Small Business Advocacy Review Panel to rationalize a longer Tier 2 gasoline compliance schedule for small refiners are generally applicable to the U.S. refining industry as a whole. EPA should not agree to such a schedule. In addition, expanding the definition of entities that can receive small refiner privileges would be particularly ill-advised. Finally, the expected new technology benefits of allowing compliance delays for small refiners may not materialize. However, a more reasonable compliance schedule for the whole industry will make the successful implementation of emerging desulfurization technologies far more likely. The scarcity of engineering and construction resources is a worldwide issue, not just a small refiner issue.

Another commenter states that the Agency should allow the marketplace to reward companies that can progressively keep up with changing technologies. Commenter notes that it operates a PADD IV small refinery but is prepared to make the necessary investments to meet a single, national standard. Another commenter adds that the small refiner provisions would make the investments by other competitors less economic and may reduce their willingness to make the necessary investments which would further tighten supply availability. An association argues that it is feasible and cost-effective for all refiners including small independent refiners to meet the proposed sulfur standards. An analysis completed by MathPro, a recognized refinery modeling consultant, indicated that even the small refineries in the PADD 4 region of the country should have no problem achieving the 30 ppm standard without economic harm.

One commenter argues that all refiners should meet the same, regional levels for sulfur emissions. Finally, a commenter states that when smaller refineries are disadvantaged on a per barrel cost versus large refineries, the economic trend favors supply from the large refineries via new pipeline capacity and the eventual shutdown of smaller, regional refineries. Instead of special provisions, the small refiners should be allowed to participate in the ABT program.

**Commenters: Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), Exxon Company, USA (IV-D-119), (Equiva Services LLC (IV-D-168) p. 3, Koch Petroleum Group, LP (IV-D-72), p. 35-36, 37, Phillips Petroleum Company (IV-D-82), p. 2, A4, A8, Ultramar Diamond Shamrock Corporation (IV-F-115)**

**RESPONSE:** Our program is designed to allow for dual investment and implementation. This avoids equipment and construction constraints, among other factors. However, we believe our gasoline sulfur program should coincide with the introduction of Tier 2 vehicles in 2004 because these vehicles will need low sulfur gasoline. To balance the needs of the Tier 2 vehicles and vehicle manufactures with the needs of the refining industry, we are allowing some refiners additional time to comply with the 30/80 standard via our ABT, geographic phase-in, and small refiner provisions. We believe our overall fuel program will provide a sufficient amount of low sulfur gasoline for the Tier 2 vehicles that will need it beginning in 2004.

Program timing is a key issue for all refining companies. We believe our ABT program for credits and allotments, in conjunction with the timeframes for standards implementation, will provide adequate compliance lead time for the vast majority of refiners. However, because program timing is perhaps even more critical for small refiners, they will need additional lead time beyond the amount provided to the rest of the industry, for the following reasons: First, many, if not most, of the small refiners have limited, if any, additional sources of income beyond their refinery for financing the equipment necessary to produce low sulfur gasoline. Because these small refiners



typically do not have the financial backing that larger and generally more integrated companies have, including large companies that own refineries that produce relatively small volumes of gasoline, they need additional time to secure capital financing from their lenders. Second, additional lead time will be necessary for the refiners to study options, perform permitting and engineering, and construct new equipment. Since most large and small refiners will need to install additional processing equipment to meet the sulfur requirements, a tremendous amount of competition will ensue for technology services, engineering manpower, and construction management and labor. Vendors will be more likely to contract their services with the major companies, whose projects will offer larger profits for the vendors, than with the smaller companies. Finally, many small refineries are geographically isolated relative to others, making compliance a bit more challenging. Therefore, we believe the additional lead time (four years) that we are providing small refiners is appropriate.

We also believe that small refiner refineries should be permitted to use sulfur credits and allotments, like other refineries, to meet their average standard. Although these credits are necessary for small refiners to comply with their standards, they are not sufficient. Given that small refiners have limited sources of capital in comparison to most other refiners, requiring them to also comply with a 30 ppm refinery average "on paper" through credits would be cost prohibitive for them since they will also need to be dedicating funds for purchasing desulfurization equipment. We believe their limited finances should be focused on the purchase of desulfurization equipment since our ultimate goal is to bring actual sulfur levels down to 30 ppm. The money that small refiners will save by purchasing fewer credits (to meet a relaxed average standard) is money that they can dedicate to their purchase of desulfurization equipment. Hence, we are providing them temporary less stringent standards and ABT.

**COMMENT C.10:** Terminals will not be able to handle two different gasolines -- one from large refineries meeting the 30 ppm standard and the second from small refiners meeting a less stringent standard. At the least, small business terminals should be provided comparable relief. **(Independent Fuel Terminal Operations Association (IV-D-158), p. 7-9)**

**RESPONSE:** Given the fungible nature of the fuel distribution system, terminals should not have a problem accommodating gasoline produced by small refiners. As discussed above, we believe that the standards we are finalizing for our downstream program will accommodate not only the higher sulfur levels of the small refiner gasoline but also the higher sulfur levels (i.e., higher than 30/80) of the gasoline produced by all other refineries (including those who produce gasoline for use in the geographic phase-in area) using credits and allotments to comply with their standards during 2004-2006. By 2007, when 100 percent of light-duty vehicles and light light-duty trucks are meeting the Tier 2 emission standards, only a small fraction of gasoline will have sulfur levels higher than 30/80. During this time frame, the higher sulfur gasoline produced by small refiners will be mixed with sufficient amounts of complying gasoline prior to retail distribution so that only marginal increases in overall sulfur levels will result. In addition, we are not imposing segregation requirements for small refiner gasoline. Such a requirement would, in effect, create an additional grade of gasoline for the entire distribution system to handle--the costs for such a requirement, given the small volume of small refiner gasoline and short duration of their interim standards, would be prohibitive.

**COMMENT J:** EPA must carefully evaluate whether the small refiner relief provisions should be modified to assist those refineries that will face the largest desulfurization challenges and to avoid anti-competitive impacts. DOE provides an analysis that shows how smaller refineries are situated geographically and by degree of desulfurization challenge. The analysis indicates that many of the small refineries are in the least challenged group and many are located in highly competitive regions like the Gulf Coast. This suggests that any special relief must be kept to a minimum and must recognize these

complex problems. DOE also notes generally that such a change may mitigate some problems. However, relief mechanisms become increasingly complicated to implement, raise competitiveness and trade issues, and allow increasing amounts of higher sulfur gasoline into the distribution system in ways that are difficult to monitor or control without new and burdensome downstream compliance regulations. This can only lead to greater logistical, enforcement, and environmental problems. **(U.S. Department of Energy (IV-D-121), p. 5, 10, Encl. 3)**

**RESPONSE:** We disagree with DOE's assessment of which refineries are most challenged. Challenges include current sulfur levels, technical and equipment considerations as well as financial capability. In developing our gasoline sulfur program, we evaluated the need and the ability of refiners to meet the 30/80 standards as expeditiously as possible. This analysis is described in detail in the RIA. Our first conclusion from this analysis was that refineries owned by small businesses face unique hardship circumstances, compared to larger companies. We have provided an extended phase-in for a small group of refiners that represents less than four percent of the overall gasoline volume, and a much smaller percentage in the areas of greatest environmental need. The primary reason for this consideration is that small businesses, in general, lack the resources available to large companies which enable the large companies (including those large companies that own small volume refineries) to raise capital for investing in desulfurization equipment. The small businesses are also likely to have insufficient time to secure loans, compete for engineering resources, and complete construction of the needed desulfurization equipment in time to meet the standards adopted today which begin in 2004.

We also concluded from our refiner evaluation that many states in the Great Plains and Rocky Mountain areas of the United States have a somewhat less urgent environmental need for ozone precursor reductions in the near term. Moreover, their gasoline supply is dominated by that produced by small capacity, geographically isolated refineries located therein. As a general rule, refineries in this area will have the most difficult time of all refineries nationwide in competing for the vendor, supply, engineering, and construction resources needed to modify their refineries to comply with the standards. Over 80 percent of the gasoline sold in this area is produced by the relatively small refineries located therein.<sup>2</sup> Similarly, Alaska faces a less urgent environmental need for reductions in ozone precursors, has no meaningful products pipelines to gain access to gasoline from the lower 48 states, and has refineries which are clearly geographically isolated.

We determined that a more orderly and cost-efficient phase-in of the 30 ppm standard could be achieved if all gasoline sold in this area was subject to somewhat less stringent standards than those in the rest of the country for a short time. This approach would allow the refineries producing gasoline for use in this area more compliance flexibility, more time to install and prove out the equipment needed for compliance, and thus a greater opportunity to reduce their overall costs. By stretching out demand for construction and other related services during the 2000-06 period, these provisions should also help to reduce the overall costs of the gasoline sulfur program.

Finally, recognizing that the small entity and geographic phase-in programs may not have provided all the hardship relief which might be needed, we have included a general hardship provision which provides other refiners a limited opportunity to demonstrate hardship.

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<sup>2</sup> Much of this gasoline is produced by small volume refineries that are not owned by small businesses, and are therefore not afforded the flexibility of the small refiner provisions described in Section IV.C.2.

## **Issue 18.2: Details of Small Refiner Provisions**

**COMMENTS A and B:** EPA should incorporate additional flexibility for small refiners with respect to the installation of the technology necessary to reduce sulfur levels to the 2004 interim level and with respect to the proposed hardship extension. Small companies should have the ability to appeal to EPA for a higher sulfur level if costs outweigh the benefits of achieving the proposed interim and final standards, particularly since newer lower-cost technologies may not be adequately tested in time or perform as expected. The interim 200 ppm level could require the use of the same expensive technology as the 30 ppm level, and frustrate the intent of the small refiner provisions. In addition, the proposed rule only allows for a two year hardship extension, from 2008 to 2010. However, if the new technology is not available at a reasonable cost, the capital expenditures could be prohibitive for small refiners. EPA should allow small refiners to renew this hardship waiver after the initial two year period. The petition process has been followed in other regulations, such as the determination of the refinery baseline under the gasoline anti-dumping baseline compliance rules.

EPA should implement the delayed implementation schedule as proposed but should not require small refiners to meet interim sulfur levels prior to 2008, since it would force them into applying costly and unproven technologies to their manufacturing process. [See also Issue 15, Comment D.] Without the interim standards, small refiners likely will be able to take advantage of new, more cost-effective technologies.

**Commenters:** Countrymark Cooperative, Inc. (IV-D-154), p. 3, Gary-Williams Energy Corp. (IV-D-74), p. 2-3, 4, Gary-Williams Energy Corporation (IV-F-41), Gary-Williams Energy Corporation (IV-F-122), Pennzoil-Quaker State Co. (IV-D-128), Peterson, J. (IV-D-254), United Refining Company (IV-D-147)

**RESPONSE:** Given the air quality and vehicle control system need for low sulfur gasoline, we believe our phase-in approach and small refiner provisions are reasonable. We have determined a time frame (four years) and interim standards that are feasible for small refiners as a group. Based on comments received on our proposal, we are also allowing small refiners to generate and use credits and allotments for compliance with the average standards for their refineries. This should greatly buffer potential problems related to technology, cost, and leadtime. Furthermore, we have a provision for extensions in 2007 for those small refiners that face additional unanticipated difficulties.

**COMMENT C, P:** Allowing small refiners to meet less stringent standards through the year 2007 is sufficiently flexible. More flexibility than this is unwarranted and would result in an unenforceable and ineffective program. (U.S. Public Interest Research Group (IV-F-102))

The proposed seven year phase-in period for small refiners should be reduced to five years. EPA is being too lenient in allowing refiners to obtain an extension because the refiner is able to "demonstrate severe economic hardship." Such an exception could be abused. (**League of Women Voters (IV-D-213), New Jersey Environmental Lobby (IV-D-261)**)

**RESPONSE:** Beginning January 1, 2008, all refineries owned by small refiners must meet the national sulfur standard of 30 ppm on average and the 80 ppm cap, except those small refiners that apply for and receive a hardship extension of their small refiner status and unique standards. Based on the comments received on our proposal, we are also allowing small refiners to use credits and/or allotments that they generated and/or to purchase credits and/or allotments from another refinery to meet their average standard during 2004-2007. We solicited comment on whether small refiners subject to the interim standards

should be permitted to use credits towards meeting those standards, and several small refiners who already produce very clean gasoline commented that the special small refiner standards do not benefit them in any way. These refiners argued that if they could generate sufficient sulfur credits in 2000-2003, or could obtain such credits through purchases from other refiners, they would not participate in the small refiner program but would instead participate in the sulfur ABT program. But since they are not positioned to generate credits (due to their already low sulfur levels), and have little certainty of being able to purchase credits, they need the relief provided by the small refiner provisions. We concur with these concerns and thus permit small refiners to use ABT credits and allotments. Small refiners may only use ABT credits and/or allotments to comply with their refinery average standard, not the per-gallon caps applied to their gasoline.

**COMMENT D:** If the final gasoline sulfur rule provides an extended compliance period for small refiners, the final rule should also require these refiners to demonstrate their commitment to produce complying low-sulfur gasoline at the end of the extended period. Commenters recommend specifically that the rule include requirements for compliance plans, progress updates, and/or appropriate penalties for lack of construction progress or the supply of non-complying gasoline. **(Equiva Services LLC (IV-D-168), Independent Refiners Coalition (IV-D-120), Marathon Ashland Petroleum (IV-D-81), p. 42, Sunoco, Inc. (IV-D-73), p. 4, 16, Tosco Refining Company (IV-F-56))**

**RESPONSE:** We agree with this comment. This final rule includes a compliance plan provision for those refiners who may seek a hardship extension of their approved interim standards. This provision requires that those refiners with approved interim standards who may seek a hardship extension must have submitted a series of reports to EPA discussing and describing their progress toward producing gasoline that meets the 30/80 ppm standards by January 1, 2008. We expect that small refiners will need to begin preparations to meet the national standards in 2008 by 2004. However, we understand that the potential exists for some small refiners to face additional hardship circumstances that will warrant more time to meet the standards. For this reason, we have adopted provisions (see above) allowing refiners subject to the interim standards to petition us and make a showing that additional time is needed to meet the national standards. To properly evaluate hardship applications, we are requiring demonstrations of good faith efforts towards assessing the economic feasibility, along with the business and technical practicality of ultimately producing low sulfur gasoline. Such progress reports must be submitted for a refiner to receive consideration in any future determinations regarding hardship extensions. However, these reports are not required from refiners who will not be seeking a hardship extension.

**COMMENT E:** A fixed baseline should be used because the variable baseline proposed by EPA would mean that small refineries that have been producing lower-sulfur gasoline are held to a more stringent compliance deadline than are those that have been producing higher-sulfur gasoline. In effect, they are being punished for doing something that the EPA now wants them to do. A fixed baseline also addresses concerns about the potential need to shift away from low sulfur feedstocks in situations in which low sulfur feedstocks may have been used in the baseline period. The variable baseline also does not recognize the higher value of low-sulfur crude oil feedstocks. **(Inland Refining, Inc. (IV-D-13), p. 1-2)**

**RESPONSE:** The same average standard for all small refiners is not appropriate, because it is intended as an interim approach to allow small refiners more time to comply, not just as a break regardless of what they need. The individual baseline-based standards are a more tailored approach to give each small refiner more time while at the same time ensuring that their sulfur levels stay as low as possible during that time frame.

The cap standards for the first two "bins" of refineries (that is those with baseline sulfur levels from zero to 30 and 31 to 200) have been relaxed somewhat from the proposal based on comments that the proposed standards for these two bins were more stringent than the options under discussion for all other refiners. Refineries that fall into these bins now have a cap of 300 ppm. We believe that these small refiners should be able to meet the average standards without much, if any, change to their operations but the more lenient cap will give them some flexibility for turnarounds, unexpected equipment "upsets", or crude slate changes. In addition, these refiners will be able to use ABT credits and allotments to meet their standards.

**COMMENT F:** EPA should revise the proposed rule to improve the bond requirement for small refiners, which would help ensure efficient implementation. SAA provides three recommendations regarding this issue: First, EPA should draft a bond form to encourage standardization. [SAA will provide input regarding the text on the bond form upon request]. Second, considering the lag time between the refining process and the export for sale, surety companies are faced with the challenge of underwriting a long-term obligation. When making a long-term surety guarantee, surety companies are essentially making a high-risk judgment regarding the long-term financial and operational viability of a refiner. EPA should draft a bond form that responds to all claims, regardless of when the violation occurred, which removes some uncertainty for the surety when undertaking a long-term obligation. Under this format, the surety is certain that its liability ceases when it is replaced by another surety, which assumes all prior "latent" liability. Third, EPA should require that surety bonds be provided by a corporate surety listed in U.S. Dept. of the Treasury Circular 570 (Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds). **(The Surety Association of America (IV-D-54))**

**RESPONSE:** We reviewed the comments carefully regarding the suggested changes to the bond provisions for foreign refiners that establish individual baselines and participate in the sulfur control program. With regard to the recommendation that we specify the precise language for the bonds, we believe it is not appropriate for us to be involved in this level of detail between private parties. The language currently contained in section 80.94 has not been problematic and therefore we will not specify the exact bond language. We do believe, however, that the other two suggestions regarding the potential delay between the time of violations and the surety obligation and the recommendation regarding the use of U.S. Treasury Department listed companies are appropriate. We have, therefore, revised the regulations to incorporate both these recommendations as suggested.

**COMMENT G:** In order to provide small refiner relief, EPA must allow small refiner gasoline to be sold into the common stream of gasoline for the interim period. Small refiner gasoline should not be singled out as a potentially undesirable product as is the case for EPA's proposed downstream enforcement program. **(Murphy Oil USA, Inc. (IV-D-117), p. 6)**

**RESPONSE:** It is not the intent of the small refiner provisions to de facto create a situation where small refiner gasoline is a potentially undesirable product. There is no requirement that small refiner gasoline be segregated from the rest of the pool. Given the ABT program for credits and allotments during 2004-2006 for all refiners and the geographic phase-in, only some gasoline will actually meet the 30/80 standards in 2005. For the purposes of liability and enforcement downstream of the refinery gate, Product Transfer Documents must be used to track the sulfur levels of all gasoline batches, including gasoline produced by small refiners.

**COMMENT H:** EPA should allow self-certification of small refiner status. **(Murphy Oil USA,**

**Inc. (IV-D-117), p. 9)**

**RESPONSE:** Refiners seeking small refiner status under our gasoline sulfur program must apply to us in writing no later than December 31, 2000, requesting this status. This application for small refiner status must contain the information specified in the regulations (§80.235). A qualifying small refiner, domestic or foreign, may apply for an individual sulfur baseline by December 31, 2000 for any refinery owned by the company by providing us with the following information:

Employment Information

- A listing of the name and address of each location where any employee of the company worked during the 12 months preceding January 1, 1999.
- The average number of employees at each location based upon the number of employees for each of the company's pay periods for the 12 months preceding January 1, 1999.
- The type of business activities carried out at each location.

Crude Capacity Information

- The total corporate crude oil capacity of the refiner as reported to the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE) under the Federal Administration Act of 1974.

We do not believe that this application process is onerous. Self-certification by small refiners is not appropriate, because it is necessary for us to be able to verify whether refiners truly are eligible for the temporary interim standards, and also to avoid uncertainty among refiners as to whether they are able to meet the interim standards in lieu of the underlying national standards. We do not believe that such an approach is appropriate or consistent with the public trust.

COMMENT I: Although agrees a hardship extension is appropriate for small refiners, believes the same type of extension should be allowed for any refiner. **(Giant Industries, Inc. (IV-D-66), p. 4-5)**

**RESPONSE:** In the final rule we are adopting two "hardship" provisions for qualifying refiners, in addition to the hardship extension for small refiners. First, we are adopting a provision permitting refiners to seek a temporary waiver from the sulfur standards in certain circumstances. Under this provision, a refiner may seek permission to distribute gasoline that does not meet the applicable low sulfur standards for a brief time period, based on the refiner's inability to produce complying gasoline because of extreme and unusual circumstances outside the refiner's control that could not have been avoided through the exercise of due diligence. This provision is similar to a provision in EPA's RFG regulations, and is intended to provide refiners short-term relief in unanticipated circumstances such as an accidental refinery fire or a natural disaster.

Second, we are including a provision allowing refiners to request a limited amount of relief from the sulfur standards based on a showing of unusual circumstances that result in extreme hardship and significantly affect the ability to comply by the applicable date. As with the small refiner interim standards, this provision furthers our overall environmental goals of achieving low sulfur gasoline nationwide as soon as possible. By providing short-term relief to those refiners that need additional time because they face hardship circumstances, we can adopt a program that reduces gasoline sulfur beginning in 2004 for the majority of the industry that can comply by then.

**COMMENT J:** Recommends specific provisions for establishing a baseline for small foreign refiners. EPA should first clarify that baseline CG volume will be estimated only for refineries not operating in 1997-98. Second, foreign refiners should have to submit information about the sulfur test method as well as sampling procedures to assure consistency with domestic refiners. Third, the baseline for a foreign refinery will reflect only the volume and properties of gasoline produced in 1997 and 1998 that was imported. However, if the foreign refinery was not operating in 1997-98, EPA proposes to assign a baseline volume limit equal to its capability. This would grossly overestimate the portion of its capability that would have been imported in 1997-98. Therefore, EPA should set the baseline volume at some fraction of total production capability. **(National Petrochemical and Refiners Association (IV-D-118), p. 78-79)**

**RESPONSE:** Please see response to Comment 22.B.

**COMMENT K:** Recommends specific small refiner ABT options as additional approaches for providing relief to small refiners. One option would be to combine the concepts of a compliance supplement pool and allowance-based system discussed in the preamble and apply it to small refiners. The pool maximum, for instance, could be set at 25% of small refiners' 97/98 baseline, and then allocated to small refiners in some equitable manner, such as pro rata or some benchmark of a refinery's compliance costs. The small refiner could then use the credits to soften the burdens of meeting the 2004 targets or trade credits to another small refiner. A second option would be to provide early reduction credits to small refiners for reductions before 2004 from the refiner's 97/98 baseline. The credits would be used in the 2004-2008 time period (or beyond) to allow some flexibility meeting average sulfur levels. However, the credits would not be tradeable. This approach has more relevance than the basic ABT program which only allows for credit generation below 150 ppm, which is too stringent a level to be relevant for most small refiners. A third option would be to allow credit exchange between gasoline and diesel. This would enable small refiners that make both products to make the most appropriate investment decisions with respect to overall desulfurization efforts. One option would be to allow diesel desulfurization credits to be used to comply with the interim gasoline 200 ppm level. Credits could be based on either percentage of sulfur reduction or tons of sulfur removed. **(Gary-Williams Energy Corp. (IV-D-74), p. 4)**

**RESPONSE:** Most commenters did not support our proposed compliance supplement pool or allowance-based system. However, we have added an allotment system which allows refineries to generate allotments in 2003 and refiners to generate allotments in 2004 and 2005 based on sulfur reductions from their corporate average sulfur level. In addition, we are allowing small refineries owned by small refiners to use credits and allotments they generate or purchase from another company to comply with their average standard in 2004 through 2007. The ABT program we are implementing in 2004 is substantially liberalized from the proposal and allows all refiners to generate credits. At this point, it is premature to consider a gasoline-to-diesel sulfur tradeoff since we have not yet proposed future standards for diesel fuel sulfur and there are many issues with such a concept.

**COMMENT L:** Disagrees with replacing the SBREFA hardship provision recommendation with a general hardship provision. Concerned that if EPA attempts to broaden the hardship provisions to include too many facilities, there will be a backlash against the provisions, and then SBREFA refiners will not obtain the relief they need. The various financial tests considered by EPA, such as capital availability and amortization of investment cost compared to net income, are unworkable. The capital availability test likely would require a showing that loans are unavailable, but the loan application process is time consuming and costly for this type of capital project. Other financial measurements vary too widely to be

used. Most importantly, the ability of larger companies to allocate costs and establish differential transfer prices among various business elements makes it difficult to treat true small refiners in the same class as larger refiners. Moreover, a realistic ABT program would enable larger refiners to generate credits at their large facilities for use at their small refineries, an option not available to the true SBREFA refiners. If the hardship provision is broadened, EPA should consider a limited group defined by dual crude oil capacity caps for individual facilities and total of all refineries owned by the company. EPA in the past has used 50,000 BPD and 137,000 BPD as dual capacity caps. Given recent facility throughput expansions, those values should be increased somewhat. **(Gary-Williams Energy Corp. (IV-D-74), p. 5-7)**

**RESPONSE:** We believe based on our experience with the SBREFA process as well as our own fact finding, data analysis, and outreach that small refiners as a group face unique hardship circumstances, compared to larger refiners, in meeting the gasoline sulfur standards. Based on this information, we are not replacing the hardship provision for small refiners with a general hardship provision. Therefore, the commenters' concerns about a general hardship provision are not implicated. Our liberalized ABT program should help small refiners comply with their interim standards.

**COMMENT M:** The mechanism for establishing the interim standard is inappropriate, and EPA should include a work-in-progress provision similar to the RFG/Anti-dumping rule. Commenter explains recent refining operation changes that include the addition of an FCC. As a result of these changes, the refinery has experienced both increased volume and increased sulfur levels from its 1997/98 baseline. The interim standard for this facility would require the refinery to commit to desulfurization equipment and the refinery would likely have to install equipment designed to meet the final 30 ppm limit. The work-in-progress provision would allow for a baseline adjustment for capital project commitments made prior to the publication date of the final rule. **(Wyoming Refining Company (IV-D-148), p. 1-2)**

**RESPONSE:** We believe that the interim standards for small refiners represent appropriate reductions from baseline levels, and can be met in the leadtime provided. In addition, the final rule allows small refiners to use credits and allotments to meet the interim standards, and the 105% provision has been modified so that excess production must meet the corporate average standard in the early years instead of the proposed level of 30 ppm. This provision, combined with other modifications to the ABT program which are expected to result in increased credit availability, should provide the commenter with additional flexibility to account for refinery modifications that are not reflected in its 1997-98 baseline without having to install new equipment earlier than is feasible.

**COMMENT N:** Recommends that the small refiner benefits be limited to 105% of the overall baseline gasoline volume (including RFG), not just the conventional gasoline volume. Commenter provides detailed overview of a small refiner that produces almost all RFG with limited conventional gasoline volume. The basic rationale of providing small refiners additional time to comply is just as relevant for small RFG producers as it is for conventional gasoline producers. These companies still face significant challenges to reduce sulfur to the 30 ppm level even though their baseline sulfur levels may not be as high as conventional gasoline producers. The exclusion of RFG volume is also inconsistent with the treatment of small refiners with no data or no operation in the baseline period. Those refiners receive a baseline of 150 ppm and a conventional gasoline volume of current capacity. Under this "no data/operation" scenario, the commenter's refinery would apply the small refiner provisions to as much as 32,000 BPD instead of the less than



1,000 BPD that the commenter can account for under the proposal. Therefore, the commenter requests that EPA revise section 80.240(e) to include all gasoline, not just conventional gasoline. **(Vitol S.A. (IV-D-266))**

**RESPONSE:** As discussed in the preamble, the baseline volume for a refinery owned by a qualifying small refiner includes both conventional and reformulated gasoline. That is, the baseline volume is the total volume of gasoline produced at the refinery, including both conventional and reformulated, averaged over 1997 and 1998.

**COMMENT O: [Reserved]**

### **Issue 18.3: Definition of Small Refiner/Refinery**

**COMMENTS A - I, K AND L:** Several commenters argue that if the special compliance timetable for small refiners is maintained in the Tier 2 rule, EPA should also incorporate a capacity limit of 75,000 barrels per day (along with the 1,500 employee limit), which would be consistent with the SBA dual capacity and employment test. This is important to address concerns about large foreign refiners from qualifying as small refiners under the rule. The "small refiner" exclusion should be based on both the amount of gasoline produced and the number of employees to ensure that the amount of higher sulfur gasoline distributed for sale is limited. Also, a workforce of 1,500 employees could operate a plant with up to 500,000 barrels per day of capacity.

Two commenters add that the SBA's dual size standard is based on sound reasons. SBA found that there is a tenuous relationship between employees and refining size, since there are widely varying degrees of automation among refineries and a wide variation in non-refining activities such as retail operations. In addition, SBA noted that firms with more than 75,000 barrels per day in capacity have demonstrated their ability to survive and have access to financial markets for the investment needed to meet environmental requirements and military specifications. In the regulation of motor fuels under the CAA, there is ample precedent for using capacity limits to restrict special compliance provisions for small refiners. In the 1977 lead phase down provisions, Congress expressly imposed a capacity limit of 50K barrels per day for the special lead content levels allowed for "small" refineries. In addition, EPA adopted the same capacity limit in implementing its existing diesel sulfur regulations. Also, some California regulations have imposed capacity limitations for small refiner exceptions.

One association states that, if it proceeds with plans to provide a "small refiner" exemption, EPA should follow the Small Business Administration's (SBA) definition of small refiner. The SBA considers "firms" with 1,500 or fewer employees and not more than 75,000 barrels per day capacity for petroleum inputs, including crude oil and bona fide feedstocks, to be "small businesses." Alternatively, EPA should follow the definition of small refiner the Agency promulgated in the 1979 lead phase down rulemaking: a refinery with an average gasoline production of 10,000 barrels per day or less during a specified period of time, that is not owned or controlled by a refiner with total average production of more than 70,000 barrels per day. 47 Fed. Reg. 49322 (Oct. 29, 1979). EPA included similar barrel per day limitations in the Agency's diesel sulfur rules. 40 C.F.R. 80.2(aa). In addition, if the Agency provides preferential treatment for small refineries, it should follow the approach that California took in its cleaner burning gasoline regulations and require refiners to submit compliance plans in order to qualify as small refiners under EPA's rule.

Other commenters, however, argue that EPA should modify its proposed flexibility for small refiners to include all small refineries with capacities of 75,000 barrels a day or less. Some of these commenters also argue that the basis should be on crude oil processing capacity, and that the 75,000 BPD threshold should apply at the refinery level. Without this provision, the proposed rule will have a devastating effect on small refiners. This approach also is consistent with the small refiner provisions in section 410(h) of the Act. In addition, one of the commenters argues that the 1,500 employee test relates to a specific SBA regulation concerning qualifying for SBA loan assistance, which is not applicable to this rulemaking. Commenters argue that a threshold based on employees discriminates against companies with relatively small refining operations but a significant amount of other operations. Some commenters argue at the least, the 1,500 employee threshold should be based on refining employees, not total employees.

In addition, in order to ensure that large, integrated refiners do not take advantage of the small refiner definition, the total throughput of a refiner's parent company should not

exceed a relatively low threshold (such as 137,500, 150,000, or 175,000 bpd). One of these commenters suggested this option only if EPA decides, contrary to the commenter's position, that small refineries of large companies do not qualify for the small refinery provisions.

Senator Bennett questions whether small refiners should be determined based only on the number of corporate employees and notes that the CAA includes a definition of small refiner based on size for purposes of the low sulfur diesel program (i.e. 50,000 barrels per day or less and owned by a refiner with a total capacity less than 137,500 barrels per day). Another commenter notes the SBA definition is not binding on EPA, and is inappropriate because it fails to consider that many companies with more than 1,500 employees may have only limited refining operations, and because even for the large refiners, decisions about whether to continue refining operations will be made on a per refinery basis.

Some commenters suggest that EPA should adopt a small refinery definition that includes refineries with a 60,000 or less barrel per day crude oil processing capacity. This definition would treat this class of refineries exactly like the SBREFA refineries already included in the proposed rule. There are 38 small refineries (60,000 bpcd or less) in the U.S. that have the ability to make gasoline. This number is much larger than the 14 refineries considered by EPA under the SBREFA review. Rural populations depend on these small facilities for fuel supply. Because of size limitations, the viability of these refineries as a class will be threatened by severe fuel sulfur regulation. Drawing a line where only a few refineries have been granted temporary relief places other small refineries at a competitive disadvantage to those receiving the small refinery relief. Compliance will always be more expensive for non-SBREFA refineries than for their competition. In addition, most of the same reasons for extending relief to smaller refineries also apply to these larger, but still not large, refineries. This is a critical concern for PADD IV refineries. Commenter suggests that this definition change would go a long way toward addressing western regional concerns. One commenter suggests that this aspect of the definition could apply in attainment areas only, which limits any environmental concerns but helps almost all small refineries because they tend to be located in attainment areas, and notes that this definition is consistent with the position of the Western Governors Association.

A number of commenters argue generally that the "small refiner" exclusion should be based on the amount of gasoline produced by a refinery, not the number of employees. Commenter notes that it produces small amounts of gasoline, even though it has about 22,000 employees, and significant refining operations unrelated to gasoline production. Other commenters raise similar points, and argue that EPA should use a 50,000 BPD definition or the dual capacity criteria that EPA has used historically (50,000 BPD at any one refinery and 137,000 BPD at all refineries owned by the company).

Some commenters recommend that EPA should expand the definition of "small refiner" to include subsidiaries of larger refiners. If the rule provides differential treatment based on size, all refineries of that capacity should be treated the same regardless of ownership. Suggests the use of a simple 75,000 BPD per refinery as the definition of a refinery eligible for the small refinery provisions. The commenters argue that a company, regardless of its size, will evaluate the control costs based on the return on investment implications of the individual small refinery operation. However, other commenters argue that EPA should reject any requests to apply the small refiner exemption to smaller refineries that are owned by large corporations, and that EPA should reject calls by the refining industry to expand the already generous definition of "small refiner."

One commenter argues that the definition of small refiner should focus on the refining operations of the refiner, not on other activities unrelated to its refining business. A refiner should have to meet the following four-prong test in order to be considered a "small

refiner": (1) the primary business of the parent company and its subsidiaries and affiliates must be in the oil and gas industry; (2) total refining capacity should not exceed 125,000 barrels per day; (3) no single refinery under the parent company's control should exceed a capacity of 75,000 barrels per day; and (4) the primary output (refinery yield) is for gasoline, jet fuel, and diesel fuel for direct transportation consumption (versus asphalt or refinery intermediate products).

Another commenter states that the definition of small refiner should be based either on the threshold of 1,500 employees or a threshold for corporate crude oil throughput capacity -- for example, 300,000 b/d. While this would provide an extension to 78 of 159 operating refineries, the fraction of U.S. capacity involved would be less than 22 percent. Finally, one commenter states that EPA should consider lubricant refineries that make small amounts of gasoline as by-product as small refiners regardless of corporate employment. Commenter provides description of its facilities to document how lube- and wax-based refineries differ from traditional refineries.

**Commenters:** Alliance of Automobile Manufacturers (IV-D-115), p. 147, Amerada Hess Corp. (IV-D-245), American Petroleum Institute (IV-D-114), p. 132, Appalachian Mountain Club (IV-D-251), BP Amoco (IV-D-58), p. 6, BP Amoco (IV-F-74), Cenex Harvest States (IV-D-131), p. 2, Chevron Products Company (IV-D-62), p. 4-5, 6, 7-8, att., Colorado Petroleum Association (Denver) (IV-F-133), Environmental Defense Fund (Denver) (IV-F-133), Environmental Defense Fund (IV-D-174), p. 11-12, Ergon, Inc. (IV-D-157), p. 4-7, Fina Oil and Chemical Company (IV-D-152), p. 4, Fina Oil and Chemical Company (IV-D-270), p. 1-2, Flying J Inc. (IV-D-151), p. 5, Giant Industries, Inc. (IV-D-66), p. 3-4, Independent Refiners Coalition (IV-D-120), p. 2-4, Marathon Ashland Petroleum LLC (IV-D-81), p. 41-42, McCrery, J. (US Rep.) (IV-D-179), Pennzoil-Quaker State Co., Base Oil and Specialty Products Div. (IV-F-59), Pennzoil-Quaker State Co. (IV-D-128), Peterson, J. (IV-D-254), Ports Petroleum Company, Inc., et. al. (IV-F-64), Rao, P. (IV-D-103), Regional Air Quality Council (IV-D-134), Senate Hearing Materials (IV-D-229), Sen. Inhofe, p. 1, Sierra Club, Utah Chapter (IV-F-116), Sinclair Oil Corp. (IV-D-150), p. 2; Ex. 1, p. 5-6; Ex. 2, p. 5, 9, Society of Independent Gasoline Marketers of America (IV-F-61), Society of Independent Gasoline Marketers of America (IV-D-156), p. 4-8, Specter, A. (US Senator) (IV-D-203), Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Sunoco, Inc. (IV-D-73), p. 4, 16, Tesoro Northwest Company (IV-D-91), Tosco Refining Company (IV-F-56), Tosco Corp. (IV-D-111), p. 3-4, United Refining Company (IV-F-99), United Refining Company (IV-D-147), Williams Companies, Inc. (IV-D-53), p. 3, Williams Energy Services (IV-F-114)

**RESPONSE:** Today's action identifies those refiners that may experience disproportionately higher burdens in complying with the regulations, and by providing temporary relief the majority of the program can begin in 2004. Some commenters recommended that small volume refineries owned by large companies be accorded the same treatment as refineries owned by small businesses, as defined by the SBA. However, one unique factor affecting small businesses that own refineries is their relative difficulty in raising the capital needed to make significant refinery modifications. Large companies that own small volume refineries are not in the same situation, since they will have other refineries, or other operations, that can be used to generate capital. Even if the large companies choose to make decisions about investments on a refinery-specific basis, their situation is not the same as small businesses who do not have the option of looking to other operations for capital.

When we conducted the Small Business Advocacy Review Panel, we did not exclude any parties on the basis of their employee number even though we focused on reaching those refiners we believe most clearly met the SBA size standard (Standard Industrial

Classification code 2911). This standard, for the purposes of regulation, specifies that for a petroleum refining company to qualify as a small business, it must have no more than 1500 employees corporate-wide. The standard also states that, *"for purposes of Government procurement, the firm may not have more than 1,500 employees nor more than 75,000 barrels per day capacity of petroleum-based inputs, including crude oil or bonafide feedstocks. Capacity includes owned or leased facilities as well as facilities under a processing agreement or an arrangement such as an exchange agreement or a throughput. the total product to be delivered under the contract must be at least 90 percent refined by the successful bidder from either crude oil or bona fide feedstocks."* Since our use of the size standard for RFA/SBREFA purposes had nothing to do with procurement, we only used the 1,500 employee limit to define a small refiner.

In the lead phase-down program for gasoline, we used a definition of "small refinery" that Congress adopted in 1977 specifically for the lead phase-down program. The definition was based on crude oil or feedstock capacity at a particular refinery (less than or equal to 50,000 barrels per calendar day (bpcd)), combined with total crude oil or feed stock capacity of the refiner that owned the refinery (less than or equal to 137,500 bpcd). In 1990, the lead phase-down program was complete and Congress removed this provision from the Act.

Shortly before the Act was amended in 1990, we set standards for sulfur content in diesel fuel, including a two-year delay for small refineries. We used the same definition of small refinery as we used in the lead phase-down program. This two-year delay, like many of the small business flexibilities in our gasoline sulfur proposal, was aimed at problems that small refineries faced in raising capital and in arranging for refinery construction.

In the 1990 amendments to the Clean Air Act, Congress rejected this small refinery provision, and instead allocated allowances to small diesel refineries under the Title IV Acid Rain program. (See CAA Section 410(h).) This approach was also aimed at helping small refineries solve the problem of raising the capital needed to make investments to reduce diesel sulfur. Congress provided allowances to small refineries that met criteria similar to that used in the lead phase-down provision – based on the crude oil throughput at a particular refinery, combined with the total crude oil throughput of the refiner that owned the refinery.

As mentioned above, the CAA definition was based on crude oil or feedstock capacity at a particular refinery (less than or equal to 50,000 bpcd), combined with total crude oil or feed stock capacity of the refiner that owned the refinery (less than or equal to 137,500 bpcd). However, given the mergers, acquisitions, and other changes that have transpired throughout the refining industry in the past few years, we believe the appropriate boundary today is a corporate capacity less than or equal to 155,000 bpcd.

All fuel actions prior to our gasoline sulfur rule were done only in the context of the CAA. With SBREFA, there's a new approach for assessing and mitigating impacts on small businesses. This is the approach we used. We believe that by defining a small refiner as having no more than 1,500 employees and 155,000 bpcd will provide relief only to those refiners who are truly challenged by our regulations without compromising the environmental goals of our program. Even though we assessed other measures to identify small entities (for example, unique refining operations, low gasoline volume, or low crude capacity), none could be implemented with undermining the environmental goals or creating anti-competitive issue in local areas.

We are adopting a geographic phase-in of the low sulfur standards that will provide additional flexibility for many small volume refiners who would not be defined as small businesses. The phase-in provisions allow for the sale of gasoline in certain states that

meets a less stringent refinery average standard than the rest of the country, through 2006. Many small volume refineries are located in, and market to, the states in the geographic phase-in area, and thus will have additional time to reduce sulfur levels to 30 ppm on average. Therefore, while we are not modifying the definition of small refiner to include small volume refineries owned by large companies, such refineries will receive additional flexibility under the final rule.

**COMMENT J:** EPA needs to modify the definition of small refiner and procedures for qualifying to be consistent with SBA practices. The proposed Tier 2 rule does not specify whether the number of employees is to be determined on a specific day. The Small Business Act mandates a twelve-month average. Because this determination is essential to obtaining small refiner regulatory relief, EPA should revise the proposed average to state explicitly that the employment measure encompasses this twelve-month average. Supports EPA's proposal that small refiner status would not be lost if the refiner later exceeded 1,500 employees. Also, recommends that EPA defer to SBA determinations regarding small refiner status because SBA is the agency authorized by statute to determine a company's small business status. (Murphy Oil USA, Inc. (IV-D-117), p. 6-9, State of Wisconsin (IV-D-193))

**RESPONSE:** As discussed in the preamble, we are modifying how the employee number is determined. Our proposed definition, which was intended to follow the SBA's definition, applied to any petroleum refining company having no more than 1,500 employees throughout the corporation as of January 1, 1999. We selected that date and point-in-time approach to prevent companies from "gaming" the system, and because we believed it reflected the SBA definition. However, as SBA pointed out in its comments, the Small Business Act regulations specify that, where number of employees is used as a size standard, as we proposed for small refiners, the size determination is based on the average number of employees for all pay periods during the preceding 12 months. Since we intended to use SBA's size standard in our proposal, we are incorporating that definition correctly in today's action. It is also worth mentioning that SBA shares our concerns about preventing companies from gaming the system and that it solved this problem specifically by using the average employment over 12 months. In addition, the averaging concept was designed to properly address firms with seasonal fluctuations, according to SBA.

**COMMENT M:** Disagrees with the use of January 1, 1999 as the deadline for establishing a company as a small refiner because it inhibits the ability of companies transferring small refinery operations for legitimate reasons separate from gaming considerations identified by EPA. A dual capacity cap (per refinery and per refiner) would be a better approach. (Pennzoil-Quaker State Co. (IV-D-128))

**RESPONSE:** In identifying the small refiners most susceptible to the economic challenge of meeting our low-sulfur requirements, we closely examined the Small Business Administration's (SBA) definition of small refiner for the purposes of regulation. In that assessment we concluded that the SBA definition provided a reasonable metric for identifying the refiners that would be significantly impacted by our sulfur program requirements. By adopting the SBA definition we could expeditiously provide certainty of small refiner status to refiners who applied for the temporary compliance flexibility. In addition, we're amending the small refiner definition to include a corporate capacity cap. We believe such a volume limitation for refining companies is necessary to ensure that only truly small businesses benefit from the relaxed interim standards. We do not believe an individual refinery capacity is appropriate for our definition of "small" because there are many small volume refineries owned by large companies, and such refineries should be more easily able to meet the low sulfur standards than small businesses, since they are

owned by larger companies that are more likely to have access to capital for refinery investments.

In divestiture situations where a large company sells a refinery to a small business owner, that refinery would be eligible for the interim standards provided the new refiner met the employment and crude-capacity requirements specified in section 80.235 of the Code of Federal Regulations. However, we want to avoid incentives to divest of refineries as a means to qualify as a SBREFA refinery.

**COMMENT N:** Supports the proposed definition of small refiner. Also supports allowing small, specialty refiners that produce less than 20,000 bpd of gasoline the ability to apply for the same flexibility as those refiners that employ fewer than 1,500 people.  
**(Countrymark Cooperative, Inc. (IV-D-154), p. 2, State of Wisconsin (IV-D-166), Washington State Dept. of Ecology (IV-D-175))**

**RESPONSE:** This comment generally supports our proposed small refiner definition and argues for expanding the definition (and resulting flexibilities) to include specialty refiners that produce less than 20,000 bpd of gasoline. We are not expanding our small refiner definition due to our belief that although specialty refiners may not produce a lot of gasoline, they may be owned by larger companies. We concluded from our experience with the SBREFA Panel and our own refiner analysis that refineries owned by small businesses face unique hardship circumstances, compared to larger companies and would therefore have more difficulty in producing low sulfur gasoline. The small businesses are likely to have insufficient time to secure loans, compete for engineering resources, and begin construction of the needed desulfurization equipment in time to meet the standards adopted today which begin in 2004. In addition, small businesses lack the resources available to large companies which enable the large companies (including those large companies that own small volume refineries) to raise capital for investing in desulfurization equipment.

#### **Issue 18.4: Other Small Refiner Issues**

**COMMENTS A AND B:** The flexibility provided to small domestic refiners under the proposed rule will not lead to imports of higher sulfur gasoline. Under GATT, any importer is required to meet the same small refiner requirements as domestic refiners. The issue of whether the small refiner exemption would lead to imports of higher sulfur gasoline was fully reviewed in the SBREFA process with outside counsel opinion letters being provided by three small refiners. This issue is more fully addressed in a letter from B&P to Mr. Jere Glover on behalf of Placid. As of the SBREFA meeting, no importer of gasoline to the U.S. was identified as meeting the requirements of a small refiner. **(Gary-Williams Energy Corp. (IV-D-74), p. 7, Placid Refining Company, LLC (IV-F-69))**

Small refiner relief is consistent with GATT and the WTO rules. The basic concern of GATT is non-discriminatory treatment of foreign producers versus domestic ones. GATT only requires that imported products be "accorded treatment no less favorable than that accorded to" domestic products; it does not require large foreign producers to be favored over domestic ones or to be treated the same as small U.S. producers. Further, GATT allows the U.S. to exercise its sovereignty to treat similarly-situated producers alike and different ones differently. A nationality neutral accommodation for small refiners in the gasoline sulfur rule is based on an inherently objective criterion --size-- and is entirely consistent with GATT. Commenter attaches an outside legal memorandum on this issue. **(Murphy Oil USA, Inc. (IV-D-117), p. 14-15, att.)**

**RESPONSE:** These comments generally support our proposed small refiner provisions. However, it should be clear that the SBREFA program applies to all refineries equally, both foreign and domestic. Even so, not all small entities participate in the EPA process and there will be no "list" of small entities until applications are received and approved in 2001.

**COMMENT C:** The provisions for small refiners may magnify international disparities because all foreign refiners may demand the same treatment as small domestic refiners under certain interpretations of "equal treatment" under the GATT. **(Valero Energy Corporation (IV-F-78))**

**RESPONSE:** EPA disagrees that the small refiner interim standards are inconsistent with the National Treatment provision of the GATT. Both foreign and domestic refiners who meet the regulatory criteria are eligible for the interim standards. In addition, the interim standards provisions serve an important environmental purpose by phasing in the ultimate low sulfur standards later for those refiners in unique situations who are expected to have the most difficulty in complying with the 30 ppm refinery average standard. Also, both foreign and domestic companies not otherwise eligible for SBREFA may apply for a hardship extension under our rule.

**COMMENT D:** EPA should provide additional information on the impact of low sulfur requirements on small refineries in California. (Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256))

**RESPONSE:** California refiners are covered by the small refiner provisions for gasoline they send out of state if they meet the employee cutoff and corp volume limit. At this point there may be only one small refiner of gasoline in California. If this is the case, and that refiner applies for and receives SBREFA status, they will be covered by the same rules.

**COMMENT E:** EPA should ensure that small refiners will have adequate access to



emerging, low cost technologies given the limited number of vendors. **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256))**

**RESPONSE:** We believe that the temporary compliance flexibility we are offering to qualifying small refiners will ensure that these refiners will have access to emerging low-cost technologies, given the limited number of vendors. If by 2006, the technology is still not readily available, small, challenged refiners could incorporate these factors into their petition for a hardship extension which could provide them up to two additional years to comply with the national standards.

**COMMENT F:** Too many foreign refiners may be able to qualify for small refiner status or be able to create new corporate entities in order to qualify, and then act to take advantage of the system. EPA needs to act to avoid this concern. These refiners would not even have to make sulfur reduction investments; they could dump high sulfur fuel in the US and then shift high sulfur fuels away from the US in 2008. To address this problem, one commenter suggests that EPA should limit the small refiner provisions to foreign refineries with anti-dumping baselines. This limits the number of new entities that could spring up to take advantage of these provisions and reduces complexity of product classifications. Other commenters suggest that EPA require foreign refiners that intend to use the small refiner provisions to certify that they will ultimately meet the low sulfur requirements. **(American Petroleum Institute (IV-D-114), p. 133-134, Independent Refiners Coalition (IV-D-120), p. 4, Koch Petroleum Group, LP (IV-D-72), p. 38, Mobil Oil Corp. (IV-D-113), p. 3-4, Sunoco, Inc. (IV-D-73), p. 13-16, Tosco Corp. (IV-D-111), p. 2-4)**

**RESPONSE:** As with domestic small refiners, foreign small refiners must submit a compliance plan only if they believe they may seek a hardship extension of the interim standards. We are offering temporary compliance flexibility to both foreign and domestic small refiners who qualify for the flexibility by meeting certain criteria. Specifically, a qualifying refining company must have 1) no more than 1500 employees corporate-wide, based on the average number of employees for all pay periods from January 1, 1998 to January 1, 1999, and 2) a corporate crude capacity less than or equal to 155,000 bpcd for 1999 to qualify for the temporary compliance flexibility. For refineries owned by governmental entities, the employee count includes all employees of that government, just as privately owned refineries must count all employees of the corporation. We believe treating refineries owned by foreign governments the same as small refineries owned by larger corporate entities follows the same logic, since economic hardship for this provision is not based solely on the refinery's business resources, but on access to capital from all related sources—parent companies, subsidiaries or governmental entities. We believe that these criteria, coupled with our compliance plan provision (for those refiners who may seek a hardship extension) and volume limitation provision (described in the preamble), will prevent any refiner from unjustly taking advantage of the flexibility that we designed for small, challenged refiners. In addition, other countries, including Canada, Japan, and the EU, are adopting low sulfur standards, so foreign refiners who import to such areas would need to desulfurize more of their production than just what is exported to the U.S.

EPA disagrees that only foreign refiners who have anti-dumping baselines should be eligible for the interim standards. As stated above, we do not believe that foreign refiners will have an unfair advantage compared to domestic refiners, and we do not believe that there is a need to limit eligibility for the interim standards beyond the definition of small refiner we've adopted.



## ISSUE 19: SULFUR IMPACT ON VEHICLES

**COMMENT A:** Commenters note that although sulfur does reduce catalyst efficiencies, effects vary depending on the types of emission control technology. Cars already on the road have emissions that are not affected significantly by sulfur levels. [See also Comment J, below.] Another commenter refers to an auto and oil industry study that shows that sulfur effects on emissions control technology are quickly reversed for MY 1989 cars. A third comment refers to EPA findings that many engine families with varying configurations meet the Tier 2 requirements. That commenter also argues that CRC test program documents that emissions variability between vehicles is far more significant than emissions variability due to fuel sulfur levels. EPA should focus on requiring the auto industry to develop the appropriate fleetwide averages for Tier 2 compliance based on vehicle/engine design rather than through costly fuel sulfur reductions that go beyond the API/NPRA proposal. **(American Petroleum Institute (Philadelphia - Day 1) (IV-F-131), Environmental Defense Fund (Denver) (IV-F-133), National Petrochemical and Refiners Association (IV-D-118), p. 11, Williams Companies, Inc. (IV-D-53), p. 4)**

**RESPONSE:** The commenters are correct in their assessment that reductions in catalyst efficiencies due to sulfur tend to vary from vehicle to vehicle. As stated in the Tier 2 Preamble and RIA, sulfur and sulfur compounds attach or "adsorb" to the catalyst surface. The sulfur adsorbs to the precious metals inhibiting their ability to oxidize NMHC and CO emissions, and reduce NO<sub>x</sub> emissions. Sulfur also blocks sites on the catalyst surface designed to store oxygen that are necessary to optimize NO<sub>x</sub> emissions conversion. While the amount of sulfur contamination can vary depending on the metals used in the catalyst and other aspects of the design and operation of the vehicle, some level of sulfur contamination will occur in any catalyst.

Sulfur sensitivity is impacted not only by the catalyst formulation (the types and amounts of precious metals used in the catalyst) but also by factors including the following:

- the materials used to provide oxygen storage capacity in the catalyst, as well as the general design of the catalyst,
- the location of the catalyst relative to the engine, which impacts the temperatures inside the catalyst,
- the mix of air and fuel entering the engine over the course of operation, which is varied by the engine's computer in response to the driving situation and affects the mix of gases entering the catalyst from the engine, and
- the speeds the car is driven at and the load the vehicle is carrying, which also impact the temperatures experienced by the catalyst.

Since these factors vary for every vehicle, the sulfur impact varies for every vehicle to some degree. There is no single factor that guarantees that a vehicle will be very sensitive or very insensitive to sulfur.

The National Petrochemical and Refiners Association (NPRA) argued that the CRC sulfur test program documented that the emissions variability between vehicles was far more significant than emissions variability due to fuel sulfur levels and that we should focus on requiring the auto industry to develop appropriate fleetwide averages for Tier 2 compliance based on vehicle/engine design rather than through costly fuel sulfur reductions. We disagree with this argument. While there is variability in emission results between all of the vehicles tested in all of the various sulfur test programs (not just the CRC program), the important fact is that all of the vehicles when tested in their baseline configuration on low

sulfur fuel (i.e., 30 to 40 ppm), similar to the fuel sulfur level they were certified on, met their appropriate emission standards, typically with considerable headroom (the vast majority of vehicles were LEVs). However, the results of all of the test programs show that LEV and ULEV vehicles can experience, on average, a 40% increase in NMHC and 134% increase in NO<sub>x</sub> emissions when operated on 330 ppm sulfur fuel (approximately the current national average sulfur level) compared to 30 ppm sulfur. New data generated since the NPRM on similar LEVs and ULEVs show that when these vehicles were driven on high sulfur (330 ppm) fuel for a few thousand miles, the NMHC and NO<sub>x</sub> emission increase due to high sulfur fuel increased by 149 percent and 47 percent, respectively. In other words, instead of the previous estimated 40 percent and 134 percent increases in NMHC and NO<sub>x</sub> emissions, respectively, more realistic estimates would be 100 percent and 197 percent, respectively. Also, new data generated since the NPRM for late model LEV and ULEV vehicles that meet the Federal and California supplemental federal test procedure (SFTP) standards and also have very low FTP emission levels, indicate that, on average, a 51 percent increase in NMHC and a 242 percent increase in NO<sub>x</sub> emissions when operated for a short period of time on 330 ppm compared to 30 ppm could be realized. Therefore, all the data shows that low sulfur fuel is needed for the vehicles to meet the standards in-use over their useful life.

Thus, for vehicles that have emission results closer to the standards, especially with the advent of tighter Tier 2 standards, an increase in emissions due to higher sulfur levels could easily result in emission levels exceeding the standards. The AAMA/AIAM test program found that 14 of 21 vehicles in their program failed at least one emission standard for NMHC, CO, or NO<sub>x</sub> at fuel sulfur levels below the national average. Therefore, we do not believe that it would be appropriate to require vehicle manufacturers to meet fleetwide averages at the Tier 2 levels without requiring low sulfur gasoline, since the Tier 2 standards are not feasible without low sulfur levels.

**COMMENTS B, D, E, F, and H:** Numerous commenters note that sulfur poisons the catalyst. Catalysts subjected to high-sulfur fuel experience a loss of effectiveness that cannot be recovered even after extended operation on low sulfur fuel. Supports the reduction of sulfur in gasoline in order to preserve and enhance the operation of catalytic converters and to reduce NO<sub>x</sub> and other pollutants that contribute to ozone formation. (Alliance for a Sustainable Future (Philadelphia - Day 2) (IV-F-131), Alliance of Automobile Manufacturers (IV-F-76), Alliance of Automobile Manufacturers (Atlanta) (IV-F-132), Alliance of Automobile Manufacturers (Denver) (IV-F-133), Alliance of Automobile Manufacturers (Cleveland) (IV-F-134), American Honda Motor Co. (IV-F-48), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (IV-D-167), p. 11-13, American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of Northern Ohio (IV-F-110), American Public Health Association/Sierra Club (IV-D-86), Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 3, Bell, S. (IV-F-89), Clean Air Conservancy (IV-F-75), Clean Air Council (IV-F-28), Clean Air Network, et. al. (IV-F-95), Colorado Public Interest Group (Denver) (IV-F-133), DaimlerChrysler (Mobile Emissions) (IV-F-36), DaimlerChrysler Corporation (Philadelphia - Day 2) (IV-F-131), DaimlerChrysler Corporation (Vehicle Emissions Planning) (IV-F-35), Environmental Defense Fund (IV-D-174), Environmental Defense Fund (IV-F-128), Ft. McDowell Yavapai Reservation (IV-D-250), Galik, D.S. (IV-F-79), General Motors Corporation (IV-D-209), vol. 1, p. 33-34, vol. 3, p. 8-9, General Motors Corporation (IV-D-209), vol. 1, p. 33-34, Gutierrez, R. (IV-D-55), Mason, P. (IV-F-70), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 7, Michigan Environment Council (IV-F-105), Minott, J. (IV-F-7), Mountcastle, Brooks (Philadelphia - Day 2) (IV-F-131), NE Ohio Impact Project (IV-F-80), National Automobile Dealers Association (IV-D-129), National

Environmental Trust (IV-F-26), National Park Service (IV-D-135), Navistar International Transportation Corp. (IV-D-50), p. 7-9, New Jersey Dept. of Environmental Protection (Philadelphia - Day 1) (IV-F-131), NESCAUM (IV-D-130), p. 2, Ohio Public Interest Research Group (IV-F-98), Oregon (Office of the Governor) (IV-D-902), Ozone Transport Commission (IV-F-4), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Plant, T. (IV-F-60), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Senate Hearing Materials (IV-D-228), NY DEC statement, p. 2, DaimlerChrysler statement, p. 1-2, Senate Hearing Materials (IV-D-229), Sen. Lieberman, p. 1-2; Sen. Moynihan, p. 1, Sierra Club (IV-F-3), Sierra Club, Utah Chapter (IV-F-116), STAPPA/ALAPCO (IV-D-67), p. 13-14, State of Wisconsin (IV-D-166), Texas Fund for Energy and Environmental Education (IV-D-87), Thurston, G.D. (IV-F-130), Trepal, C. (IV-F-109), U.S. Public Interest Research Group (IV-F-55), U.S. Public Interest Research Group (Atlanta) (IV-F-132), Volkswagen of America, Inc. (IV-D-60), White, Randall F. (IV-F-10))

One commenter in particular states that it is well known that sulfur can penetrate into the catalyst surface and, upon extended exposure to sulfur can cause irreversible damage to the catalyst. A variety of factors influence the degree of this impact and the extent to which it is reversible. These factors include the sulfur level in the gasoline, the catalytic composition, the catalyst design, the catalyst location, the type and control of fuel metering, the engine calibration, and the manner in which the vehicle is operated. A series of studies by the auto manufacturers and the Coordinating Research Council (CRC) confirm the negative impacts on vehicles designed to meet the LEV and ULEV standards. A completely sulfur tolerant catalyst is not available, and it is unlikely that such a catalyst will be developed. On the issue of reversibility, a recent CRC study shows that the effects of sulfur are not always fully reversible. Also, data generated by a Manufacturer of Emission Controls Association (MECA) member further confirms that when catalysts are aged on high sulfur fuel, the prospects are not good for complete regeneration of the catalyst even when low sulfur fuel is used. Attaches MECA report entitled "The Impact of Gasoline Fuel Sulfur on Catalytic Emission Control Systems," dated September 1998. **(Manufacturers of Emission Controls Association (IV-F-39), Manufacturers of Emission Controls Association (IV-D-64), p. 5)**

Another commenter argues that any sulfur contained in the exhaust stream affects the regeneration of NO<sub>x</sub> storage catalysts. Increased regeneration frequency also results in corresponding losses in fuel efficiency and increases in emissions. In addition, attempts to regenerate catalysts that have been poisoned by sulfur leads to emissions of the toxic chemical, hydrogen sulfide. AAM includes and cites to data from VW, DaimlerChrysler, Mercedes Benz, Ford, and GM that all show the dramatic declines in the effectiveness of emissions control technologies with higher sulfur levels and emphasize the importance of low-sulfur fuel to properly enable new technologies. **(Alliance of Automobile Manufacturers (IV-D-115), p. 113-118)**

STAPPA/ALAPCO and ALA provide significant discussion regarding the problems that higher sulfur fuels create with respect to the effectiveness of emission control devices and summarizes their concerns related to the accuracy of recent tests to determine sulfur sensitivity. Sulfur sensitivity is temperature dependent and sulfur adheres to the catalyst surface more thoroughly at lower catalyst temperatures (i.e. 450 to 500 C). The sulfur sensitivity results from the numerous fleet studies underestimate the sensitivity of sulfur on exhaust emissions, because the test cycles (FTP or LA4 cycles) used to saturate the catalyst with sulfur result in catalyst temperatures that are too high. Real world vehicle operation in metropolitan nonattainment areas quite frequently result in catalyst temperatures at or below 450 C. In addition, all of the vehicles in the test programs used to develop projections of sulfur sensitivities were exposed to high-sulfur fuel only for a few

miles of driving prior to emissions testing. However, sulfur can penetrate into the precious metal layer and into the oxygen storage material, affecting the catalyst's ability to store oxygen - a critical function for NO<sub>x</sub> control -- this penetration may not have fully occurred during the few miles of operation prior to emission testing on high sulfur fuel. Also, critical catalyst design criteria prevent the use of simple measures to vary the air-fuel ratio from rich to lean in order to help regenerate the catalyst after exposure to high-sulfur fuel. Manufacturers have historically designed their engines to run rich under high loads and the excess fuel decreases exhaust and catalyst temperature. The SFTP standards will require that manufacturers reduce much of the high-load enrichment in order to reduce HC and CO emissions during high loads. Therefore, exhaust and catalyst temperatures under extreme conditions will increase after implementation of the SFTP standards. While these extreme conditions must be considered, their frequency in-use is not sufficient to be relied upon for sulfur removal and it is not certain that the catalyst will fully recover even under SFTP conditions. Thus, the two changes in emission control design that some suggest should be used to reverse the detrimental impacts of sulfur on catalyst performance -- hotter catalyst temperatures and variable air-fuel ratios - both run counter to other design criteria aimed at achieving stringent emission standards. **(American Lung Association, (IV-D-167), p. 11-13, STAPPA/ALAPCO (IV-D-67), p. 13-14))**

According to one auto manufacturer, the ability to operate emission control hardware at maximum effectiveness and efficiency is seriously compromised with exposure to sulfur in fuel. The conversion efficiency of a control device believed to be necessary in the future showed a loss of efficiency of 10% within about 1,200 miles when comparing the effects of gasoline containing 50 ppm sulfur and 8 ppm sulfur. A loss of 40 percentage points was observed as mileage increased. The loss of even 10% of catalyst efficiency will result in the vehicle not meeting the proposed standards. Another auto manufacturer provided data showing the results of FTP emission tests with various fuel sulfur gasolines and emphasizes that sulfur in gasoline significantly deteriorates emissions of vehicles with a 3-way catalyst system and/or a NSR catalyst system. This commenter's data support the assertion that sulfur concentrations in the fuel affect the regeneration of the NSR catalyst due to the crystal growth of sulfate in the catalyst. Two other auto manufacturers, along with a number of other commenters, noted that DI gasoline-engines and gasoline-fueled fuel cells are advanced technology vehicles that hold significant promise for fuel efficiency goals but they are extremely sensitive to sulfur. **(DaimlerChrysler (IV-D-59), p. 3-4, Mitsubishi Motors R&D of America, Inc. (IV-D-127), National Park Service (IV-D-135), Nissan North America, Inc. (IV-D-125), p. 2-3, Physicians for Social Responsibility (IV-D-194), Senate Hearing Materials (IV-D-228), DaimlerChrysler Statement, p. 1-2, Toyota (IV-D-63), p. 1-3, United Automobile Workers, International Union (IV-D-93))**

Several commenters noted that as sulfur levels rise, tailpipe emissions will rise as well. Another commenter claimed that the implementation of low sulfur gasoline will result in immediate emission reductions from the existing vehicle fleet. Others argued that for diesel engines, higher sulfur levels in the diesel fuel inhibits the chemical reactions necessary to remove particulate matter and also reduce the effectiveness of advanced NO<sub>x</sub> reduction systems (i.e. selective catalytic reduction). When a continuously regenerating trap (CRT) system is used, its effectiveness at reducing PM is significantly reduced. One commenter in particular provides a number of graphs (as attachments to their letter) that support their position on this issue, including comparison of NO<sub>x</sub> Reductions over Simulated FTP-75 Test Cycle; Fuel Sulfur Effect on TPM Reduction over HD FTP Cycle; Fuel Type Effect on THC Reduction over HD FTP Cycle; Effect of Fuel Type on SOF Reduction over HD FTP Cycle; and Effect of Fuel Type on SO<sub>4</sub> Formation over HD FTP Cycle. This commenter provides a copy of a memorandum from Thomas L. Darlington, AIR to Navistar regarding "Nationwide Emission Benefits of a 5 ppm Sulfur Diesel Fuel for 8,500 - 14,000 GVW Diesel Vehicles." **(American Lung Association (Philadelphia - Day 1) (IV-F-131), Detroit Diesel Corporation (IV-F-92), Engine Manufacturer's Association (IV-D-**

**71), p. 12-13, Ford Motor Company (Philadelphia - Day 1) (IV-F-131), Navistar International Transportation Corp. (IV-D-50), p. 7-9, STAPPA/ALAPCO (IV-D-67), p. 13-14, Thurston, G.D. (IV-F-130), Volkswagen of America, Inc. (IV-F-54))**

Lastly, two commenters argue that because of the adverse impacts higher sulfur levels have on the catalyst and vehicle emissions, EPA should not promulgate the Tier 2 rule unless it regulates both fuels and vehicles together. EPA should explicitly declare that the program for reducing sulfur in fuels is inseparable from the proposed Tier 2 emissions standards. One commenter notes that section 202(i)(3)(C)(ii) requires EPA to find that the Tier 2 emission standards would be feasible, and section 202(a)(2) requires that EPA base any new emissions standards on technology that is possible to develop and apply within the relevant timeframe, considering costs. AAM asserts that such a finding of the infeasibility of the standards without low sulfur fuel is necessary and provides revised language for the Tier 2 rule regarding the "non-severability" of the vehicle/fuel components. The other commenter emphasizes the fact that sulfur damages the catalyst (and that the damage is irreversible) and cites to section 211(c)(1)(B) to justify eliminating sulfur as a fuel impurity, as well as the Petition to Regulate Sulfur in Gasoline Under Section 211(c) of the CAA submitted by AAMA and AIAM, dated March 19, 1998.

**RESPONSE:** All of these comments support arguments raised by EPA in our Tier 2 proposal. The RIA fully discusses and documents the facts on gasoline fuel sulfur and the impact that it has on exhaust emissions. As evidenced by these Tier 2/sulfur standards, we strongly feel that vehicles and fuel need to be treated as a system, and consequentially, regulated together. Reducing sulfur in gasoline fuel is inseparable from Tier 2 emission standards.

We are also proposing a regulation to reduce diesel fuel sulfur levels. We anticipate publishing the proposal in early 2000. This rule will address the concerns of the various commenters who noted that diesel engine aftertreatment technology is very sensitive to sulfur levels.

**COMMENTS C AND M:** Several commenters point out that new technologies such as NO<sub>x</sub> traps, require near zero sulfur fuel. EPA should ensure that the necessary low (or zero) sulfur fuel is in place to allow new technologies to expand in the marketplace. Other commenters argue that the effect of sulfur on advance technology vehicles is not a relevant basis for the low gasoline sulfur levels proposed in the Tier 2/Sulfur rulemaking because it is not yet certain what type of fuel will be used in such vehicles. **(Alliance of Automobile Manufacturers (IV-F-76), American Petroleum Institute (IV-D-114), p. 124-125, General Motors Corp. (IV-F-136), Marathon Ashland Petroleum LLC (IV-D-81), p. 63, National Park Service (IV-F-121), National Petrochemical and Refiners Association (IV-D-118), p. 13, Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 3)**

**RESPONSE:** We do not feel that it is necessary to have gasoline fuel sulfur levels below a 30 ppm average in order to meet Tier 2 emission standards. The RIA has a detailed technical discussion on the feasibility of the Tier 2 emission standards including all supporting data. All of the data found in the RIA was tested on 30 or 40 ppm sulfur level fuel. We also do not feel that advanced technologies, such as gasoline direct-injection or fuel cell technology, are required to meet Tier 2 emission standards. In Chapter IV of our RIA, we discuss in detail the technologies that will be used to meet Tier 2 standards. Although we do have some discussion on advanced technologies, we conclude that advancements to engine and catalyst technologies, along with calibration changes, are all that is necessary to meet Tier 2 standards. We do acknowledge that some advanced technologies are sensitive to sulfur and may need very low sulfur levels to be viable.

**COMMENTS G, J, K.1 - .7, Q, and R:** Some commenters note that catalyst reversibility is a problem because no technology currently exists to reverse the effects of sulfur on catalysts. Other commenters argue that catalyst reversibility is not a problem because the catalysts in the automobile converters can reverse the effects of high sulfur fuels. [See also Comment A, above.] In particular, one commenter notes that the petroleum industry has conducted research that demonstrates that there are many tools available to the emission control design engineer to make LEVs and future vehicles more sulfur tolerant and 100 percent reversible. These tools include changing the catalyst structure, the precious metals loadings on the catalyst, the ratio of precious metals, the location of the catalyst, and making engine performance adjustments. This commenter argues that the Agency's conclusion that sulfur causes irreversible impairment of catalytic converters is factually incorrect and therefore statutorily unsupportable. EPA is only authorized to adopt a fuel control if the emission products of the fuel "will impair to a significant degree" the performance of emission control systems. The Agency has interpreted "impair" too broadly. The statutory provision was intended to apply to emission products, which actually do poison an emission control system, such as lead. By comparison, sulfur effects are only temporary on an emission control system. Further, since sulfur impacts are indeed reversible, there is no justification for the Agency's conclusion that a national program is necessary, as opposed to a regional approach.

Several commenters suggest that EPA needs to reassess its assumptions and projections concerning sulfur irreversibility and sensitivity and that EPA should correct the assumption that the "irreversibility effect for SFTP-compliant vehicles will be about 50 percent." These commenters state that industry research confirms that the effects will be no greater than 15 percent. A refining organization argued that the data are insufficient to reach this conclusion. There should be a full test program to address the large discrepancy between pre-SFTP and SFTP-compliant vehicles. Changes in the degree of actual calibration and air-fuel mixture could significantly affect EPA's reversibility findings. The commenters believe that EPA is unduly pessimistic regarding the capability of the automobile manufacturers to overcome design constraints needed to meet SFTP standards that are expected to influence reversibility. They add that EPA's focus on fuels in this regard is inconsistent with section 211(c)(2)(B) of the CAA, which expressly requires the Agency to evaluate "emission control devices or systems which are or will be in general use and do not require the proposed [fuel] control or prohibition." These commenters add that the operation of vehicles over the US06 cycle results in both higher catalyst temperatures and more fuel enrichments than on the LA-4 cycle. But, as noted in a recent SAE paper on the CRC sulfur reversibility test program, it is not clear which factor has the greatest impact on the sulfur removal. (C. Schleyer et al., 1999).

Two of the commenters note that EPA focuses extensively on air-to-fuel ratio tightening and removal of rich operations as factors influencing the sulfur reversibility of vehicles in compliance with the SFTP, while appearing to completely ignore the influence of catalyst design and catalyst composition effects on reversibility. However, automobile and catalyst manufacturers have options available with respect to catalyst design and composition that will mitigate the effects of sulfur on emissions. Many of these design options do not necessarily require major shifts in technology. Draft Tier 2 Study (O'Keefe, 1998a), Staff Paper on Gasoline Sulfur Issues (O'Keefe, 1998b), and (Truex and Caretto, 1999).

These same commenters and another argue that EPA's assessment of reversibility for SFTP-compliant vehicles was arbitrarily biased by the placement of excessive weight on results from a bench laboratory-based catalyst test program which are highly questionable and of doubtful applicability, while giving short shrift to more realistic data generated by the CRC and API programs. In particular, the data from the Johnson-Matthey test program are of doubtful applicability because the vehicle used is not representative of near-term future production technology and the procedures used do not reflect actual vehicle operating



conditions. The commenters further argue EPA is incorrect and arbitrary in its discrediting of the API and CRC data on sulfur reversibility for SFTP-compliant vehicles, and that the Agency has little basis for suggesting that the reversibility of emissions impacts is worse following long-term exposure to higher gasoline sulfur levels than from short-term exposures.

Other commenters suggest that EPA provide additional information and data on reversibility and should investigate the issue of reversibility in the context of new California LEVs that have been exposed to both high and low sulfur gasoline. Finally, one commenter notes that additional testing is required to determine what, if any irreversibility occurs at 300 ppm and if there is a point at which it ceases to be a problem. That point could be well above the 80 ppm cap proposed in the rule.

**(American Petroleum Institute (IV-D-114), p. 4, 111-113, 114-117, 119 Conoco, Inc. (IV-F-120), General Motors Corp. (IV-F-136), Giant Industries, Inc. (IV-D-66), p. 1-2, Giant Industries, Inc. (IV-D-92), p. 1-2, Koch Petroleum Group, LP (IV-D-72), p. 44, Marathon Ashland Petroleum LLC (IV-D-81), p. 24, 51, 52, 53, 54, 55, 57, Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Mobil Oil Corp. (IV-D-113), p. 10, Senate Hearing Materials (IV-D-229), Marathon statement, p. 2, National Petrochemical and Refiners Association (IV-D-118), p. 12-13, U.S. House Committee on Science (IV-D-253), p. 1, United Automobile Workers, International Union (IV-D-93))**

RESPONSE: Sulfur contaminates the catalyst. In addition, essentially all vehicles that have been tested show that this effect is not reversible for one or more pollutants. Perhaps the most significant factors for reversibility are the mixture of air and fuel entering the engine and catalyst temperature. The results of numerous studies and test programs show that rich exhaust (absence of oxygen) mixtures in addition to high catalyst temperatures (in excess of 700°C) can remove sulfur from the catalyst. Rich exhaust mixtures can occur intentionally and unintentionally, depending on the level of sophistication of the fuel control system. An intentional rich exhaust mixture is known as fuel "enrichment." There are different types of enrichment. For example, there is "commanded" enrichment, which is used to provide extra power when the engine is under a load (e.g., accelerations), as well as a means to cool the catalyst. Also, there is enrichment which results from the normal fluctuations in A/F that occur during typical "closed-loop" FTP operating conditions. The amount of enrichment necessary for sulfur removal is a function of several factors: the "magnitude" of the enrichment event, the duration of the enrichment event, and the frequency of which the enrichment event occurs.

While the amount of fuel enrichment is critical in the removal of sulfur from the catalyst, high catalyst temperature is equally as important. In order to meet strict Tier 2 standards, manufacturers are going to have to balance tight A/F control with improved catalyst performance, with an eye towards better catalyst thermal management. Many manufacturers are going to have to depend more on the precious metal palladium for oxidation of NMOG and CO emissions, as well as the reduction of NO<sub>x</sub>, because palladium is more tolerant to high temperatures. Since the vast majority of emissions still occur immediately following a cold start when the catalyst is still cool, further reductions to cold start emissions can be achieved by locating the catalysts very close to the engine. The closer proximity to the engine helps to activate the catalyst sooner by taking advantage of the additional heat supplied to the catalyst by the exhaust manifolds. Palladium is very sensitive to sulfur and, consequentially, catalyst systems that rely heavily on this metal tend to be more sensitive to sulfur and less reversible. The precious metal platinum, although usually a little more effective at oxidizing NMOG and CO and slightly less sensitive to sulfur than palladium, is too sensitive to high temperature to survive the close proximity to the engine and is not anticipated to be used for close-coupled applications.

As discussed above, manufacturers will need to make modifications to their emission system calibrations by optimizing fuel control, spark timing, EGR and other parameters in conjunction with improvements to catalyst systems, in order to meet Tier 2 emission standards. This combination of emission control strategies can result in significant trade-offs between NMOG and NO<sub>x</sub> control. There can be considerable uncertainty associated with balancing these trade-offs at very low emissions levels if the vehicle is periodically operated on high sulfur fuels.

Our federal supplemental federal test procedure (SFTP) standards, as well as California's SFTP standards, both of which take effect in the 2001 model year, can further exacerbate this problem. The SFTP standards are intended to better address and control emissions under driving conditions not captured when compliance with our FTP-based exhaust emissions standards is demonstrated, such as operation with the air conditioning turned on or driving at very high rates of acceleration and vehicle speeds (hereafter referred to simply as aggressive driving). This is an important factor in assessing sulfur irreversibility, because Tier 2 vehicles will have to meet more stringent exhaust emission standards and will have to meet these standards over the wider variety of operating conditions included in the SFTP provisions. Hence, they will have to be designed to meet the emission standards under all such operating conditions; these design changes may influence how irreversible the sulfur effect will be, as explained below.

Since wide variations in the A/F ratio help to remove sulfur from the catalytic surface, there is concern that vehicles which meet the SFTP standards, when driven aggressively, will experience insufficient enrichment to purge sulfur from the catalyst. Currently, when driven aggressively, the A/F ratio for most vehicles (those not certified to SFTP standards) is quite variable. Meeting the SFTP standards will ensure that manufacturers carefully control the A/F ratio over essentially all in-use driving conditions. This absence of widely varying A/F could therefore inhibit the removal of sulfur from the catalyst once operation on high sulfur fuel ceased.

In order to quantify how irreversible the sulfur effect would be when catalysts exposed to high sulfur fuel are then exposed to lower sulfur fuel, several test programs were developed by EPA and industry. The vehicles in these test programs consisted of LDVs and LDTs that met either EPA Tier 1 or California LEV and ULEV emission standards. All of the vehicles were first tested at a low sulfur level (e.g., 30 or 40 ppm) to establish a baseline. The vehicles were then re-tested with high sulfur fuel (e.g., 350 to 540 ppm). After emission results had stabilized, the vehicles were again re-tested with low sulfur fuel. Prior to each of the second series of low sulfur tests, the vehicles were operated over a short driving cycle to help purge (i.e., remove) sulfur from the catalyst. Two different cycles were used to purge sulfur, representing different types of driving: moderate urban conditions and aggressive conditions. The FTP cycle, which represents moderate urban driving, and the REP05<sup>3</sup> cycle, which represents very aggressive driving (e.g., hard accelerations, high speed cruises), were the two cycles used.

The vehicles tested exhibited a wide range of irreversibility, for reasons that are not fully understood. The data published in the NPRM, showed that the effect of operation on high sulfur fuel was irreversible on one or more pollutants after operation on low sulfur fuel. NO<sub>x</sub> emissions were 15 percent irreversible. None of the vehicles were designed or modified to

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<sup>3</sup> The REP05 cycle developed by EPA is representative of all driving that occurs outside the LA4 or FTP cycle. All but one of the aggressive accelerations found in the US06 cycle were taken from the REP05. While each segment of the US06 cycle was taken from actual in-use driving, the timing and combination of these segments is not representative of in-use driving in the way REP05 is representative.

meet either the California or federal SFTP emissions standards. The only data used in an attempt to quantify the effect of aggressive operation on sulfur reversibility was from a catalyst manufacturer (Johnson-Matthey) that performed some vehicle testing with catalysts which were bench aged with low and high sulfur fuel that appeared to closely approximate the impact aggressive operation would have on sulfur irreversibility. It was this data on which we based our projection of sulfur irreversibility for Tier 2 vehicles at 50 percent for NMHC and NO<sub>x</sub> emissions. Subsequent comments on the validity of these estimates after the publishing of the NPRM prompted several additional test programs on sulfur irreversibility.

In keeping with our desire to only evaluate late-model LEV and ULEV vehicles with the most current emission control technologies, we decided to exclude the data generated by Johnson-Matthey from our database on the grounds that the vehicle tested was a Tier 0 vehicle and the emission results for the various catalysts tested were far below Tier 2 emission standards. Thus, the analysis in the final rule addresses the commenters' concerns about the Johnson-Matthey data.

The sulfur irreversibility test programs that followed the NPRM focused on vehicles that had emission levels that met or were close to Tier 2 emission standards and also met the US06 or aggressive driving portion of the SFTP emission standards. Although numerous vehicles were tested, only four met both of the above criteria. (We had tried to supplement the data base, but we only able to add a limited number of vehicles.) We also decided to quantify irreversibility for NMHC and NO<sub>x</sub> emissions together instead of independently, because per our discussion above, sensitivity and irreversibility of either pollutant appears to be very dependent on the particular strategy chosen to reduce these emissions (particularly engine calibration and catalyst loading of precious metals and oxygen storage).

The new data exhibited a range of variability among vehicles and pollutants, similar to the data presented in the NPRM. The most important distinction between the new FRM data and the old NPRM data was that the new data showed that, on average, NMHC + NO<sub>x</sub> emissions in three out of four vehicles were not fully reversible after aggressive driving. Based on this data, we project that NMHC + NO<sub>x</sub> emissions will be 20 to 65 percent irreversible for typical in-use driving, including aggressive driving.

Results from some of the new data also indicated that the amount of time the catalyst is exposed to high sulfur fuel has no impact on sulfur reversibility. A total of six vehicles were tested with a "short-term" exposure to sulfur of well under 100 miles and again with a "long-term" exposure of 1,500 to 3,000 miles. The sulfur reversibility rates were approximately the same for either case.

As discussed above, the combination of calibration changes and emission system hardware modifications needed to meet our stringent Tier 2 emissions standards, can result in significant trade-offs between NMHC/NMOG and NO<sub>x</sub> control. There can be considerable uncertainty associated with balancing these trade-offs at very low emissions levels if the vehicle is periodically operated on high sulfur fuels, making the ability to remove sulfur from the catalyst highly uncertain. For example, a given catalyst today may be fully reversible for one pollutant and only partially reversible for another. However, because of the trade-off in NMOG and NO<sub>x</sub> performance, the modifications necessary to get that vehicle to meet both emission standards may result in the opposite effect for reversibility; i.e., full reversibility for NMOG and partial reversibility for NO<sub>x</sub>. There is no technical certainty that both the NMOG and NO<sub>x</sub> emission standards can be met without compromising reversibility performance. Therefore, we continue to believe that sulfur's negative impact on Tier 2 catalysts is, in general, irreversible.

EPA disagrees with the commenter who claims that we have not complied with the statutory requirement to evaluate emissions control devices that are or will be in general use that do not require low sulfur fuel. As described in Appendix D of the RIA, we have determined that there are not (and will not be in the foreseeable future) emission control devices available for general use in gasoline-powered vehicles that can meet the Tier 2 emission standards and would not be significantly impaired by gasoline with high sulfur levels. All catalysts are sensitive to sulfur to some degree. As explained in Section IV.A of the Preamble, as well as in Appendix B of the RIA, we cannot identify one or more factors that definitively determine sulfur sensitivity, because sulfur sensitivity seems to be due to a combination of many factors that vary by vehicle. Hence, it is not possible to identify alternative designs that can tolerate existing (or even intermediate) sulfur levels and that can reasonably be expected to be applied to all cars and light trucks meeting Tier 2 standards. The commenters do not mention specific technologies that are not sulfur-sensitive, that are or can reasonably be expected to be in general use.

EPA disagrees that we must find that a fuel or fuel additive has a permanent significant impact on vehicle emissions control systems prior to regulating under Section 211(c)(1)(B). While it is true that, in the case of the phase-out of lead in gasoline, the fuel being controlled (leaded gasoline) was found to cause permanent, irreversible catalyst damage, the language of the Act does not require such a finding. The commenter provides no support for its assertion that this provision was intended to apply to emissions products which actually permanently "poison" the emissions control system. Thus, while the effects of sulfur on the catalyst are irreversible to some degree, Section 211(c)(1)(B) does not require a finding of irreversible effects to support a decision to regulate. The fact that sulfur in gasoline significantly affects the ability of vehicles' emissions control system to operate properly, resulting in emissions of some pollutants as much as 197 percent higher, is sufficient to support controlling gasoline sulfur under Section 211(c)(1)(B).

**COMMENT I:** EPA only quantified the low sulfur impact on ozone precursors and neglected to quantify the benefits for other fleet emissions/affected pollutants. Lowering sulfur is an approach that will reduce all pollutants of interest: NMHC, CO, NO<sub>x</sub>, PM and toxics, including butadiene. **(Alliance of Automobile Manufacturers (IV-D-115), p. 121-123)**

**RESPONSE:** In chapter III(A)(4)(a)(ii) of the RIA, we quantify the reductions in particulate matter (PM) that would result from the implementation of low sulfur requirements. The impact of lower sulfur fuel on toxins, including 1,3 butadiene, is also quantified in the RIA in chapter III(C)(2)(d).

**COMMENT K.8:** The RIA Appendix B assessment of reversibility and the EPA analysis of emission inventory impacts from sulfur reduction are based on contradictory assumptions. Another commenter noted that EPA's assumptions about reversibility are contradicted by the emission modeling results that show less emission reduction from instituting either the vehicle or fuel standards once the other set of standards is in place. If sulfur reductions were necessary for vehicle standards, the reductions from the vehicle standards after instituting the fuel standards should be greater than the reductions from the vehicle standards alone. **(American Petroleum Institute (IV-D-114), p. 119-120, Marathon Ashland Petroleum LLC (IV-D-81), p. 58, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 18)**

**RESPONSE:** Due to time constraints, we did not include irreversibility in the NPRM emission model. However, had irreversibility been included in the model, the emission benefits would have increased. We believe that even without the effects of irreversibility in the model, there are more than sufficient emission benefits to justify the Tier 2/Sulfur

regulations (including the effects of vehicles' sensitivity to sulfur) and that the inclusion of irreversibility would only enhance our justification.

**COMMENT K.9:** EPA has overstated the sensitivity of emissions to changes in fuel sulfur -- particularly at lower sulfur levels. The estimates in App. B of the RIA appear to be based on sulfur sensitivity algorithms from MOBILE6. The methodology used to develop these algorithms is flawed. First, EPA ignored low mileage emission data. In addition, the MOBILE6 algorithms do not account for the following: (1) regression equations based on logarithms overestimate the effects of sulfur on emissions at low sulfur levels; (2) sulfur effects on emissions are best modeled as an additive offset; and (3) the sulfur effect on NO<sub>x</sub> from high emitter vehicles is overestimated. One of the commenters provides a detailed review of these problems and refers to other comments. **(American Petroleum Institute (IV-D-114), p. 120-124, Marathon Ashland Petroleum LLC (IV-D-81), p. 59, Mobil Oil Corp. (IV-D-113), p. 10-12)**

**RESPONSE:** With regards to the use of regression equations based on logarithms, we feel that the 100K test data from the CRC and AAMA/AIAM LEV test programs clearly show the ln-ln relationship to be the best<sup>1</sup> approach to estimating the impact of sulfur. A quadratic fit will not result in effects that are significantly different from a ln-ln fit. For Tier 0 data, regardless of whether a ln-ln or quadratic fit is used, the effects are very similar.

API expressed some concern that we "ignored" relevant low-mileage data when performing our regressions. We felt that the 100K data was more representative of in-use conditions and that the 10K catalysts weren't necessarily reflective of how actual on-road catalysts would perform. We note that vehicle manufacturers argued it is not appropriate to include 10K data, especially since there isn't any 10K data for trucks. However, we have decided that it would be prudent to incorporate all of the data (4K, 10K and 100K) in our sulfur sensitivity analysis. Therefore, the approach in the final rule addresses the commenters' concerns that we have ignored low mileage data in our analyses.

We examined whether it was more appropriate to model sulfur effects as an additive or multiplicative offset and found that a multiplicative offset was more appropriate for CO and NO<sub>x</sub>, whereas an additive offset seemed to be appropriate for NMHC. Historically, we have done most fuel effects in percent change, thus we feel a multiplicative offset is the better approach.

**COMMENT K.10:** Commenter opposes the elements of the CAP 2000 rule which appear to eliminate the access to company-specific test procedures. Commenter notes that the rapid aging techniques employed by manufacturers reflect the most severe in-use vehicle deterioration conditions and seem to overstate the effects of sulfur on emission control technology. The oil industry needs to be able to evaluate the extent to which the use of different test procedures impacts the apparent effect of sulfur on emissions. That type of analysis is impossible without access to the certification test procedures used. **(American Petroleum Institute (IV-D-114), p. 153-154)**

**RESPONSE:** The CAP 2000 regulations do not prohibit anyone from gaining access to company-specific test procedures. Any party interested in gaining test procedure, or any other certification information, can make a request to the Agency through the Freedom of

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<sup>1</sup> See the CRC "Study on the Effects of Fuel Sulfur on Low Emission Vehicles," published in 1997 and the AAMA/AIAM "Study on the Effects of Fuel Sulfur on Low Emission Vehicle Criteria Pollutants," also published in 1997.

Information Act (FOIA).

We feel the real issue is whether catalyst aging procedures (e.g., bench or oven aging) are causing the sulfur impact to be overestimated. We don't believe so. The analysis we performed on the six vehicles that were tested with "short" and "long-term" exposure to sulfur seem to suggest "real-world operation" exposure to sulfur has a greater impact on sulfur sensitivity than the aging technique used. We will also be including all of the low mileage (4,000 mile) vehicle data from the API sulfur test program in deriving our sulfur sensitivity correlations.

**COMMENT K.11:** Correspondence within EPA suggests that the incremental effect of extended exposure to sulfur may be small (e.g., a vehicle designed to meet a .07 g/mi NO<sub>x</sub> standard might only be able to recover to .09 g/mi after extended exposure to high sulfur fuel). EPA also fails to address whether engine or catalyst designs could be cost-effectively modified to lessen sulfur impacts, as CRC tests reported by API suggest. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 17-180)**

**RESPONSE:** We disagree with the commenter that the effects of extended exposure to high sulfur gasoline are insignificant. In Appendix B of the RIA, we discuss the results from six vehicles that were tested with short and long-term exposure to sulfur. The results from these six vehicles indicated that long-term sulfur exposure (e.g., 1,500 - 3,000 miles) in-use on local roads and highways, resulted in significant increases in emissions when compared to short-term exposure. The increase in emissions from 30 ppm sulfur fuel to 350 ppm sulfur fuel for long-term exposure was 149 percent and 48 percent greater for NMHC and NOX, respectively, over short-term exposure.

As for the commenter's second comment on the ability to design catalysts in order to lessen the sulfur impact, we refer the reader to the response to comment A above. Sulfur does not impact engine-out emissions. There is no information to support a conclusion that modifications to engine calibrations can reliably reduce the sulfur impact to the catalyst. We again refer the reader to Appendix B of the RIA for a more extensive discussion on the interactions of calibration and engine design on sulfur sensitivity and reversibility.

**COMMENT K.12:** Commenter notes that automakers have been unable to explain why certain vehicle models demonstrate a high degree of reversibility. In light of this uncertainty, the refining industry proposal to reduce sulfur significantly by 2004, followed by workshops to evaluate the reversibility issue further, was an appropriate approach. However, the auto industry has been unwilling to meet and have reversibility data subjected to a peer review process. To date, only one public workshop has been held on this critical issue. **(Sinclair Oil Corp. (IV-D-150), Ex. 2, p. 3)**

**RESPONSE:** We disagree that the absence of complete certainty regarding reversibility of sulfur effects is a reason to delay regulation. As described in more detail in Appendix B and Appendix D of the RIA, sulfur in gasoline significantly impacts vehicle emissions control systems such that NOX and NMHC emissions are, on average, significantly higher than on low sulfur fuel. This is a sufficient basis to conclude that regulation is appropriate under Section 211(c)(1)(B) of the Act. Moreover, our conclusions regarding reversibility are supported by the available data. The fact that some of the reasons for vehicle-to-vehicle variability in the reversibility of sulfur effects are not fully known does not warrant deferring sulfur control until more information is available. We believe that there is enough information to conclude that sulfur effects are reversible to some degree, and that this irreversibility is not expected to be avoided through changes in catalyst design. In addition, it is appropriate for EPA to take a protective approach in the face of limited uncertainty

about the full extent of the irreversibility of sulfur effects, rather than losing important emissions benefits while further information is developed.

**COMMENT K.13:** EPA needs to conduct a thorough assessment of sulfur tolerant technologies. API sponsored research indicated that catalyst reformulation could significantly reduce sulfur sensitivity, but oil industry research is hampered by limited access to emission control vendor data. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 58-59)**

**RESPONSE:** We refer the reader to the response to comment A above and also to the response to comments (A-F), (H), (I), (K), (L), and (P) of Issue 26.1.2. We are still unaware of any substantial information that suggests sulfur tolerant technologies are or will be available in the future.

**COMMENT L:** The automobile manufacturers argue invalidly that use of the FTP driving cycle overstates reversibility due to unrepresentative catalyst temperatures. EPA has wrongly accepted arguments by automobile manufacturers that the FTP driving cycle causes catalyst temperatures on most vehicles to exceed 450 degrees Celsius, and that these temperatures are too high relative to those observed during real-world vehicle operation. EPA's own extensive data on consumer driving patterns and information from industry programs clearly demonstrate that the driving cycle in the FTP is less aggressive than the typical driving observed in urban areas. In addition, EPA presents little data to support the contention that operation at temperatures below 450 degrees Celsius is needed to saturate the catalyst with sulfur. **(American Petroleum Institute (IV-D-114), p. 118, Marathon Ashland Petroleum LLC (IV-D-81), p. 56)**

**RESPONSE:** Again we refer the reader to Appendix B of the RIA. We discuss the impact catalyst temperature has on sulfur sensitivity and reversibility, as well as the impact of long-term in-use exposure to sulfur compared to short-term laboratory exposure to sulfur.

**COMMENT N:** EPA has no evidence to support the claim that Tier 2 vehicles will be just as sensitive to sulfur as LEV and ULEV LDVs and not more so. This claim was made in the RIA (Chapter IV and Appendix B), which fails to report the quality of the fuels used in EPA's test programs. In addition, EPA has not tested vehicles that are complying with SFTP or proposed Tier 2 standards because these vehicles do not yet exist. Manufacturer testing is consistently showing that sulfur sensitivity increases as vehicle emissions decrease and EPA's assumption is inconsistent with this experience. AAM cites to the Coordinating Research Council (CRC) Symposium held in 1997, which concluded that no sulfur resistant technology has been demonstrated and that sulfur sensitivity has increased in vehicles designed to meet more stringent emissions standards. Enough current research exists to demonstrate the progressive sulfur sensitivity of each generation of vehicle technology. Sulfur is already causing emissions to progressively increase from Tier 0 to LEV vehicles relative to their standards. The new Tier 2 emission standards and SFTP protocols will place further restrictions on engine calibration and limits the use of enrichment as a technique to reduce the adverse effects of sulfur. AAM includes supporting documentation as obtained from Toyota, which demonstrate the effects of fuel sulfur on emissions. **(Alliance of Automobile Manufacturers (IV-D-115), p. 110-111)**

**RESPONSE:** In our sulfur database, there are approximately eight vehicles that had emission levels meeting Tier 2 emission standards when tested on 30 ppm sulfur fuel. All of these vehicles had emission levels 10 to 30% below the Tier 2 emission standards.

When comparing the sulfur sensitivity levels of these eight vehicles with the sensitivities of the rest of the vehicles in the database, it was found that the average sulfur sensitivity level for the eight vehicles was higher than for the remaining vehicles, however, statistically, there was no difference. The following table presents the sulfur sensitivity levels between the eight Tier 2-like vehicles and the remaining LEVs at a 95% confidence level.

**Sulfur Sensitivity of "LEV" and "Tier 2-Like" Vehicles  
(at 95% Confidence Interval)**

Emission Standard	NMHC	CO	NO <sub>x</sub>
LEV	33.3 ± 17.9	83.2 ± 63.5	164.0 ± 80.9
Tier 2	56.7 ± 18.4	103 ± 38.5	207.7 ± 79.1

It is not known whether any of the eight vehicles would pass SFTP standards. For modeling purposes, we have estimated that sulfur sensitivity is the same for off-cycle operation as for FTP operation and, to the extent the Tier 2 impact is uncertain to some degree, we believe our estimates are conservative.

**COMMENT O:** EPA has failed to fully consider section 211(c)(2)(B) of the CAA, which requires the Agency to evaluate emission control devices, or systems, that do not require the proposed fuel revision. **(American Petroleum Institute (IV-D-114), p. 4)**

**RESPONSE:** See our response to comments G,J, K.1-K7, Q, and R above, as well as Appendix D of the RIA.

**COMMENT P:** Higher sulfur levels will lead to a greater incidence of fuel-related false positive OBD readings and difficult to diagnose fuel-related emissions problems. **(National Automobile Dealers Association (IV-D-129), p. 3)**

**RESPONSE:** We have addressed this concern in our staff paper titled "OBD & Sulfur Status Report," published in 1997. We stand by our conclusions, stated in the paper, that higher sulfur fuels will not lead to a greater incidence of false positive OBD MIL illuminations.

**COMMENT S:** Making current NO<sub>x</sub> trap catalytic converters more resistant to sulfur poisoning would lower catalytic NO<sub>x</sub> efficiency. **(Mitsubishi Motors R&D of America, Inc. (IV-D-127))**

**RESPONSE:** We agree with the commenter. However, since we are reducing the level of sulfur in gasoline in this rulemaking and are hoping to propose reductions to sulfur levels in diesel fuel in early 2000, we feel that EPA will have resolved the commenter's concern.

**COMMENT T:** EPA needs to evaluate whether lubricating oil sulfur levels will affect catalyst performance and tailpipe emissions. EPA should conduct exploratory tests and then a full-scale investigation if warranted. Exploratory testing should include renewable motor oils, such as canola motor oil, to determine whether these oils assist in sustaining catalyst efficiency and reducing tailpipe emissions. If so, EPA needs to promote the use of these renewable oils. **(Rao, P. (IV-D-103))**

**RESPONSE:** Vehicle manufacturers have been testing LEV and ULEV vehicles on very low



levels of sulfur as part of the CARB TECH V fuel test program. Vehicles have been tested at sulfur levels of 5, 30, and 100 ppm. During a presentation to EPA on the preliminary results from the program, AAM suggested that sulfur levels from lubricating oils are approximately 3 - 5 ppm. Since our program will ultimately have an average sulfur level of 30 ppm, we believe that any impact on emissions resulting from such a low level of sulfur will be insignificant. Lubricating oil specifications are determined by vehicle manufacturers, not EPA. Therefore, manufacturers can determine whether lower levels of sulfur are necessary in lubricating oils. Also, there are already sulfur-free lubricating oils available. Synthetic oils have very low levels to no sulfur. Therefore, at this time we do not feel it is necessary to perform a full scale investigation into the effects of lubricating oil sulfur levels on emissions.

## **ISSUE 20: REFINERY AIR POLLUTION PERMITTING REQUIREMENTS**

### **Issue 20.1: NSR Streamlining Options/Issues**

**COMMENT A:** The need for NSR permits (and the possible NSR revisions) will be a serious obstacle to any attempt to fast track the air permitting process for Tier 2 fuels. **(Louisiana Mid-Continent Oil and Gas Association (IV-D-68), p. 1-2, Marathon Ashland Petroleum LLC (IV-D-81), p. 36) (See other letters listed under Comments A.1 and A.2 that follow.)**

**RESPONSE:** EPA does not expect the NSR permit requirements to be a serious obstacle to obtaining timely permits to enable refiners to begin the changes needed to comply with the new gasoline desulfurization requirements. To help ensure expeditious review, it is important that refiners submit their applications for proposed refinery modifications to the appropriate permitting authority in a timely manner. Some States have indicated to EPA that they are already in the process of preparing their permitting staffs for the permit applications that are likely to be submitted. In the unlikely event that timing issues arise, however, EPA is prepared to provide support in the form of special permitting teams that will provide direct assistance to refiners and permitting authorities.

**COMMENT A.1:** EPA's proposal suggests that industry can use legal means to avoid NSR. However, the definition of "legal" is currently being debated and industry and state regulators will be very cautious in taking any steps to avoid NSR without EPA's formal blessing, because of the extensive enforcement actions being taken by EPA against industry under existing NSR regulations. **(National Petrochemical and Refiners Association (IV-D-118), p. 47-48, The Coastal Corporation (Refining and Chemical Division) (IV-F-73))**

**RESPONSE:** The EPA regulations and guidance for NSR define the types of changes at an existing source which require NSR permitting as well as the circumstances under which a major source is allowed to make physical and operational changes without triggering a major NSR permit. For example, where the applicable regulations permit it, a refinery may legally avoid major NSR by ensuring that emissions increases resulting from physical or operations changes from proposed changes do not exceed the applicable significance levels for major modifications. EPA is committed to providing timely guidance to refiners, state permitting authorities and the public where questions arise regarding the applicability of any Federal regulatory requirement, or available legal methods to avoid the application of such requirement, to any specific refinery project making changes to comply with the gasoline sulfur control program.

**COMMENT A.2:** For instance, one option EPA raised is the use of a plantwide applicability limit (PAL). Commenters state that no refinery to their knowledge has ever received a PAL, and one commenter stated that it has had a Title V PAL application pending for four years. New NSR revisions could change EPA guidance on PALs and result in even more delays. **(Coastal Corporation (IV-D-159), p. 3, Koch Petroleum Group, LP (IV-D-72), p. 9-10)**

**RESPONSE:** EPA has decided not to pursue special guidance on plantwide applicability limits (PALs) to accommodate modifications refineries must make to comply with gasoline sulfur control requirements. The comments we received generally indicated that this type of permitting tool would not be particularly beneficial for the majority of refineries affected by these rules.

**COMMENT B:** Any NSR/PSD permit streamlining must be handled through rulemaking in order to give some certainty to the process. This is important given recent OECA enforcement efforts that seem to reinterpret NSR guidance relied on in the past. **(American Petroleum Institute (IV-D-114), p. 14, BP Amoco (IV-D-58), p. 8)**

**RESPONSE:** Based on the comments and other information we received in the response to the proposal, EPA believes it is not necessary or appropriate to develop options which would exempt refineries from the normally applicable NSR process and applicable requirements. This position is supported by: (1) the comments of States that industry can, in general, apply and receive NSR permits in time to comply with the final gasoline sulfur control requirements; and (2) the recognition of industry's potential ability to use emissions reductions at the source to net projects out of major NSR which would otherwise be applicable. Thus, EPA believes that permits can be issued to refiners in a timely manner under the existing permitting requirements and policy.

The type of streamlining now envisioned will involve expeditious review and processing of permit applications. To this end, EPA will provide assistance on the proper application of the NSR rules on an expedited basis. EPA intends to provide guidance on the selection of BACT and LAER in order to help expedite that important step of the NSR process. Also, EPA will provide States with guidance on the use of vehicle emission reductions, resulting from the use of low sulfur gasoline, as emission offsets for refineries in nonattainment areas whose emissions will increase as a result of complying with the gasoline sulfur control requirements. None of these types of assistance needs to undergo rulemaking in order for them to be provided, as they are intended only to clarify existing requirements, and they do not change any existing regulatory provision or impose any new requirement.

Finally, we disagree with the commenter's claim that EPA has reinterpreted its NSR guidance. We believe that we have been consistent in our interpretations of the regulatory requirements, including any exemptions. Where special assistance is needed to better understand which regulatory requirements apply, EPA has been, and will continue to be, prepared to be available to provide technical support and guidance.

**COMMENT C.1:** If the compliance deadline is not extended, EPA should consider providing limited relief for refiners by establishing standardized permits (with specific submittal and review deadlines) and/or presumptive BACT requirements. The standardized permit could be published in the Federal Register as a proposal for comment and then as a final permit. States could then adopt the standardized permit with enforceable requirements and a set of generally acceptable or presumptive control technologies. **(Coastal Corporation (Refining and Chemical Division) (IV-F-73), Coastal Corporation (IV-D-159), p. 5, Marathon Ashland Petroleum LLC (IV-D-81), p. 37) (See other letter listed under Comment C.2 that follows.)**

**RESPONSE:** The final gasoline sulfur rule is structured to allow additional lead time for certain refineries to make desulfurization changes later than the proposed 2004 compliance date to meet Tier 2 requirements. This extension of the proposed compliance deadline coupled with the measures EPA will take to provide guidance on control technology selection and mobile source offsets will provide an added level of assurance that permits can be issued well within the necessary deadlines for refineries to comply with the gasoline sulfur control program. Regarding the recommendation for a standardized permit, considering the potential variability in individual refinery projects, EPA does not believe it would be beneficial to issue national guidance on model or standardized permits. We feel that our efforts to ensure certainty and timely permits will be better spent in developing guidance on control technology selection and mobile source offsets. The EPA is, however, through its permitting teams, willing to work with individual state air pollution

permitting agencies who may wish to develop such tools as model permits.

**COMMENT C.2:** MACT technology could be used as presumptive BACT for applicable processes. **(National Petrochemical and Refiners Association (IV-D-118), p. 52)**

**RESPONSE:** EPA disagrees with the recommendation that MACT technology should establish a presumptive BACT. Pursuant to section 112(b)(6) of the Clean Air Act, PSD does not apply to hazardous air pollutants ("HAPs"). At the same time MACT standards are aimed at controlling HAPs. The programs simply address different environmental goals. Under PSD, for instance, BACT involves a case-by-case analysis considering the energy, environmental and economic impacts of the various control options available to the source, only one aspect of which is the collateral effects a control option may have on the emissions of hazardous pollutants. MACT, on the other hand, is applied specifically for the purpose of controlling hazardous pollutants. Nevertheless, it is appropriate to consider a particular MACT technology in the BACT analysis when it effectively controls the PSD pollutant under review, as well as hazardous pollutants.

**COMMENT D:** EPA, state, and industry representatives should agree, to the extent reasonable, on presumptive BACT control technologies for the new gasoline sulfur reduction units that must be built to comply with this regulation. Commenter notes that PALs, model permits, or Title V consolidation appear to provide little incremental benefit. **(American Petroleum Institute (IV-D-114), p. 17, Exxon Company, USA (IV-D-119), p. 2)**

**RESPONSE:** EPA is developing guidance on BACT/LAER and intends that a draft of the guidance material will be available for public review and comment before it is made final. We will consider the comments from the refinery industry, state and local regulators and the public in preparing final guidance. EPA has decided not to provide any guidance on PALs, model permits, or Title V consolidation specific to these rules, because the comments we received generally indicated that these permitting tools would not be particularly beneficial for the majority of refineries affected by these rules.

**COMMENT E.1:** Supports efforts to streamline the permitting process, such as developing generic guidance on model permits and other new and innovative tools. EPA should consider, as a joint effort with the states, the development of a flexible, site-wide emissions cap based on current allowable emissions. Commenter also suggests incorporation of NSR terms into Title V permits and suggests that EPA provide relief from NO<sub>x</sub> SIP Call requirements for low sulfur fuel projects. Finally, commenter suggests that there be a fast-track process to enable early credit generation under an ABT program. **(Alliance of Automobile Manufacturers (IV-D-115), p. 149, BP Amoco (IV-D-58), p. 8-9, BP Amoco (IV-F-74), Exxon Company, USA (IV-D-119), p. 1-2, SC Department of Health and Environmental Control (IV-D-56), p. 4, STAPPA/ALAPCO (IV-D-67), p. 16, Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Thomas Questions, p. 1; Inhofe Questions, p. 2) (See other letter listed under Comment E.2 that follows.)**

**RESPONSE:** EPA has decided not to pursue any special national effort to develop site-wide emission caps (here called "plantwide applicability limits," or "PALs") for refineries pursuant to the gasoline sulfur control requirements. *See EPA's response to Issue 20.1.B.*

With regard to the timing and process for incorporating NSR permit terms into title V operating permits, *see EPA's response to Issue 20.1.K.*

With regard to the commenter's recommendation to provide relief from NO<sub>x</sub> SIP Call requirements for refineries needing to make modifications to comply with the gasoline sulfur control requirements, EPA does not plan to interfere with the States' decision making regarding their strategies for reducing NO<sub>x</sub> emissions pursuant to the NO<sub>x</sub> SIP Call. The NO<sub>x</sub> SIP Call directed certain States to submit SIP revisions addressing those NO<sub>x</sub> emissions from their State that contribute significantly to downwind ozone nonattainment. Each State has full discretion to choose any set of controls that would assure the necessary reductions. 63 FR 57,356; 57,378 (Oct. 27, 1998).

Regarding the commenter's suggestion about the ABT program, see EPA's response to Issue 17.

**COMMENT E.2:** Within the OTR there are a number of refineries that might benefit from a State/EPA initiative. Streamlining of permits will require considerable state involvement. **(Ozone Transport Commission (IV-D-112), p. 3-4)**

**RESPONSE:** EPA believes that its efforts to provide guidance on BACT/LAER determinations, guidance on the use of vehicle emission reductions as offsets, and case specific technical assistance will help ensure that NSR permits are issued in a timely manner. This effort will benefit any affected refinery, including those located in the ozone transport region.

**COMMENT F:** EPA should acknowledge that refinery changes are mandated by the federal sulfur rule and relinquish any federal oversight or review function in the state permit process. **(American Petroleum Institute (IV-D-114), p. 15, Marathon Ashland Petroleum LLC (IV-D-81), p. 36)**

**RESPONSE:** EPA oversight is a critical component for ensuring the Clean Air Act's Part C and D programs (for the permitting of major new sources and major modifications) are carried out appropriately and consistently nationwide. It has been EPA's experience that a lack of appropriate federal oversight can lead to inconsistency and improper permitting. Consequently, EPA does not intend to relinquish its federal oversight responsibility or role for the issuance of permits to refineries proposing modifications to comply with the final gasoline sulfur control requirements. EPA does intend to use its oversight role to provide guidance intended to expedite the permit process regarding emissions control technologies and emissions offsets.

**COMMENT G:** EPA should exempt construction (required to comply with gasoline sulfur control requirements) from any PSD review or oversight related to Class 1 areas. **(American Petroleum Institute (IV-D-114), p. 15)**

**RESPONSE:** Class I area protection involves statutorily-based requirements contained in the Prevention of Significant Deterioration (PSD) permitting requirements under part C of the Act. EPA cannot authorize exemptions from required processes in situations where the emission increases caused by a refinery subject to the PSD requirements may have an adverse impact on the air quality related values in a Class I area. Where there is reason to believe that proposed emission increases at a refinery could potentially have an adverse impact on a Class I area, EPA recommends that refiners notify the State and, although not statutorily required, the Federal Land Manager of the affected area as early as possible in order to ensure adequate time to analyze the source's impacts and apply measures, as may be appropriate, to prevent an adverse Class I area impact.

**COMMENT H:** EPA should allow pre-permit activity such as excavation, pilings, footings, and retaining walls. **(American Petroleum Institute (IV-D-114), p. 15, BP Amoco (IV-D-58), p. 9)**

**RESPONSE:** NSR is a preconstruction requirement; the applicable regulations require a permit before a source is to "begin actual construction." [See, e.g., 40 C.F.R. § 52.21(i)(1).] These rules define "begin actual construction" as follows: "initiation of physical on-site construction activities on an emissions unit which are of a permanent nature. Such activities include, but are not limited to, installation of building supports and foundations, laying underground pipework and construction of permanent storage structures." [E.g., 40 C.F.R. § 52.21(b)(11).]

The purpose of these regulations is to ensure that a source's permit conditions are not influenced by construction that occurs prior to final permit decisions. Because EPA believes that the current permitting system will not hinder the timely issuance of permits for Tier 2-related modifications, at this time the Agency is not considering allowing additional pre-permit activities to occur at refineries beyond what is currently provided for under the current regulations. If, however, a refinery has unique circumstances it believes necessitate unique treatment, it is encouraged to contact its state or local permitting agency and EPA to discuss whether accommodations can be made.

**COMMENT I:** EPA should allow multiple projects to be permitted with extended construction commencement dates. **(American Petroleum Institute (IV-D-114), p. 15-16)**

**RESPONSE:** EPA disagrees with the commenter's recommendation and does not believe that extending construction commencement dates has any bearing on the timely construction or modification of equipment needed to produce low sulfur gasoline. Elsewhere, refiners have raised as their main concern the need to commence construction early, rather than later, in order to meet the compliance deadlines in the Tier 2/gasoline sulfur control rules. EPA does not believe that refinery construction activities which pertain to "more comprehensive longer term" modifications (presumably unrelated to the required desulfurization project) should be granted extended deadlines simply because they may be part of the same permit application. In fact, the inclusion of extra projects in the permit application could cause a lengthening of the time needed to review and issue the permit needed to make the changes to comply with the final gasoline sulfur control requirements. This would be counterproductive to the timely commencement and completion of the necessary refinery changes. Construction activities unrelated to the production of low-sulfur gasoline, as well as activities related to the production of low-sulfur gasoline, must be reviewed against the applicability requirements, including deadlines for commencing construction (or where appropriate phased construction), as specified by the applicable regulations and allowed for in the final permit.

**COMMENT J:** EPA should grant a pollution prevention exemption from new source review permitting (or any other applicable rules) for the installation of control equipment that will be required. For instance, the installation of a new sulfur recovery unit, approximately 99% of the sulfur is removed from the product, but about 1% will be emitted as SO<sub>2</sub>. However, without the new sulfur recovery unit, 100% of the sulfur would be emitted as SO<sub>2</sub> from vehicle tailpipes, and NO<sub>x</sub> emissions would be higher. Thus, a pollution prevention exemption is warranted. Another commenter suggests that this approach is appropriate given the substantial vehicle NO<sub>x</sub> reductions that will occur. Provides estimate that while Houston/Galveston stationary source NO<sub>x</sub> emissions would increase by about 700 tons,

tailpipe NO<sub>x</sub> emissions would decrease by about 11,000 tons per year. **(American Petroleum Institute (IV-D-114), p. 16, Exxon Company, USA (IV-D-119), p. 2, Marathon Ashland Petroleum (IV-D-81), p. 36-37, Pennzoil-Quaker State Co. (IV-D-128), p. 10)**

**RESPONSE:** Under EPA's current policy regarding pollution control projects, a desulfurization project at a refinery could not be granted an NSR exemption as a pollution control project on the basis of area-wide vehicle emission reductions resulting from the use of low-sulfur gasoline. EPA's current policy only applies to "physical or operational changes whose primary function is the reduction of air pollutants subject to regulation under the Act at existing major sources." [Emphasis added.] EPA further indicated that the production of inherently less-polluting fuels is not a pollution control project under the guidance. [See EPA's July 1, 1994 memorandum titled "Pollution Control Projects and New Source Review (NSR) Applicability," from John Seitz, Director, Office of Air Quality Policy and Standards, to the EPA Regional Air Division Directors.] To the extent that a refinery project designed to comply with the final gasoline control requirements would qualify as a pollution control project on the basis of its primary purpose being the reduction of emissions at the refinery, it may qualify for an exemption from NSR under EPA's current policy, to the extent it would be allowed by the permitting authority. Otherwise, EPA believes that the emissions increases at refineries that may occur as a result of required gasoline desulfurization projects should be subjected to the same level of review that applies to major modifications in general.

**COMMENT K:** EPA should make a determination through rulemaking that control equipment is exempt from specified permitting requirements. Commenters suggest specifically some or all of the following steps: Provide exemption from the NSPS at 40 CFR subpart J for sulfur plants and/or FCCUs whose operations or configurations may have to be modified to support low-sulfur gasoline, at least to the extent the operations or configuration are changed as a result of manufacturing low-sulfur gasoline. Provide relief from subpart J "fuel gas" provisions for hydrogen plant off-gas routed to the furnace. Provide substantive relief for similar streams of low H<sub>2</sub>S or low Btu content caused by process operation or configuration changes, if routed to a fuel gas combustion device as an economical means of controlling VOC or HAP emissions under MACT or RACT or similar regulatory regimes. Provide relief from subpart QQQ (petroleum refinery wastewater) requirements at least outside battery limits (OSBL) of low-sulfur gasoline process units, including the wastewater treatment plant. Subpart QQQ applicability should be strictly limited to the wastewater equipment installed to support new process equipment for low-sulfur gasoline. Waive the "aggregate facility" impact assessment of subpart QQQ. Provide relief from risk management plan (RMP) requirements if triggered by installation of new equipment or reconfiguration of existing equipment. This could take the form of delay of RMP implementation until the next five-year update cycle. Provide relief from greater than 1:1 offset ratios for VOC, NO<sub>x</sub>, etc. in non-attainment areas. Provide relief from control requirements on methanol released in trace concentrations with CO<sub>2</sub> from hydrogen plants. Require permitting only of new sources that will need to be added to a refinery. Avoid the PSD questions related to "affected facilities" - upstream and downstream impacts and calculating small emissions changes can really bog down the permit application preparation and review. The advantage of this approach is that the permitting can occur earlier in the design phase since only the large new equipment will need to be scoped out. Waive consideration of debottlenecking/capacity utilization issues. Exempt the gasoline sulfur reduction and associated facilities from incorporation into the Title V operating permit until the next renewal. Exempt the gasoline sulfur reduction and associated facilities from compliance assurance monitoring (CAM) until the next Title V operating permit renewal. **(American Petroleum Institute (IV-D-114), p. 16-17, BP Amoco (IV-D-58), p. 9, Coastal Corporation (IV-D-159), p. 5)**

**RESPONSE:** The commenters recommended relief for refineries from a number of existing Federal requirements. Basically, EPA has concluded that it would not be appropriate to create new exemptions from any existing requirements specifically for refineries required to comply with the Tier 2/gasoline sulfur control program.

(1) NSPS/NESHAP: Most petroleum refineries are major source emitters of hazardous air pollutants (HAP) and also release high levels of non-HAP criteria/ambient pollutants. Over the past twenty years, the EPA has developed a number of standards to regulate refinery emissions. Existing standards include 40 CFR part 60 subparts J, VV, and QQQ; part 61, subpart FF; and part 63, subpart CC. These standards have already been implemented and affected units are already included in existing permits. We believe that the refining industry has a good understanding of these regulations and can predict their impact on new low-sulfur gasoline process units.

The EPA is currently developing 40 CFR part 63, subpart UUU (refinery MACT II) and working to minimize the complexities of the final standards. To assist the refineries, the EPA has delayed promulgation of the rule to coordinate its implementation and compliance with the Tier 2 fuel standards. In addition, where possible, the EPA is planning to allow previous compliance demonstrations from part 60, subpart J to be used under part 63, subpart UUU.

(2) Risk management plans: EPA cannot provide relief from Risk Management Plan requirements when triggered by installation of new equipment or reconfiguring existing equipment. Also, we cannot grant a delay in implementing the Risk Management Plan requirements until the next five-year permitting cycle. Section 112(r) of the Clean Air Act Amendments of 1990 established Accidental Release Prevention Program provisions to prevent the release of hazardous chemicals where the public could be harmed, such as the Bhopal, India incident in 1984 where several thousand people were killed. As part of the requirements of this program, EPA was mandated by Congress to require every facility that basically stores or uses greater than a threshold quantity of any of the hazardous substances listed in section 40 CFR 68.130, to develop and submit a Risk Management Plan containing a hazard assessment for each of the hazardous substances, an accidental release plan for mitigating any releases and evacuating citizens if warranted, and other pertinent information.

There are requirements in 40 CFR part 68 for renewing, revising, and submitting Risk Management Plans that EPA cannot countermand. Currently, Risk Management Plans must be updated every five years, unless there is a modification of the facility. The information required in the Risk Management Plans is integral in preventing accidental releases and potentially harming the public. Every time equipment and/or new chemicals are added or modified, the information needed for these Risk Management Plans needs to be updated. A change in equipment need not lead to massive changes in the submitted Risk Management Plan. It is also essential for facilities to keep these plans updated so that, at least, the accidental release plan can be distributed to Local Emergency Planning Committees, so they can be apprised of mitigation measures and evacuation procedures for potential accidental releases of hazardous substances. In addition, EPA believes it would be more beneficial for facilities to consider the Risk Management Plan requirements when a facility is constructing or reconstructing; this would allow them to change or modify processes or use less-hazardous substances which would both lower the risk to the public and benefit the environment, as a whole. Finally, EPA believes it is worth noting that the installation of new equipment or reconfiguration of existing equipment might improve safety at the facility, and the facility might want to report that improvement.

(3) Offsets: EPA does not believe that special relief from the part D NSR offset requirements is appropriate or necessary. The Act requires any proposed major source or



major modification in a nonattainment area to obtain sufficient offsets based on the proposed emission increases and, for ozone, the classification of the nonattainment area. Offsets are required to ensure that the new emission increase will not interfere with progress toward attainment of the national ambient air quality standards in the area. EPA is not authorized to exempt refineries, or any other sources, from the statutory offset ratio requirements. If the State sets aside creditable emission reductions for new and modified sources to use as offsets, individual sources can avoid having to secure the reductions themselves. Accordingly, because EPA believes generally that there will be sufficient emission reductions resulting from vehicles using low-sulfur gasoline to provide for the needed offsets, EPA has encouraged States to use some of these reductions for offsets.

(4) Methanol control: EPA notes that the commenters' recommendation was the subject of an earlier rulemaking in which we revised the petroleum refinery MACT to exempt methanol released with CO<sub>2</sub> from hydrogen plants. The Refinery MACT Rule, 40 CFR 63 subpart CC, was amended on June 9, 1998 to exempt the following process vents:

"Hydrogen production plant vents through which carbon dioxide is removed from process streams or through which steam condensate produced or treated within the hydrogen plant is degassed or deaerated."

*See 63 FR 31358; June 9, 1998*

(5) Debottlenecking: EPA does not intend to change its existing NSR regulations and policy to establish special exemptions for desulfurization projects pursuant to the Tier 2/gasoline sulfur control requirements. (*See EPA's response to Issue 20.1.B.*) Consequently, refiners are expected to account for any emission increases resulting from the removal of a process bottleneck at one or more units within a refinery whether the debottlenecking results from changes to be made to comply with the final gasoline sulfur control requirements or from other changes proposed simultaneously with the required desulfurization project.

(6) Title V: Title V permits must assure compliance with applicable requirements of the Clean Air Act, including new applicable requirements associated with gasoline desulfurization projects, in accordance with the regulations at 40 CFR part 70. These regulations do not authorize the commenters' request for a blanket exemption from incorporation into title V operating permits. Similarly, compliance assurance monitoring (CAM) requirements may apply to gasoline sulfur reduction and associated facilities at facilities with title V permits prior to permit renewal, in accordance with the regulations at 40 CFR part 64. The CAM regulations do not authorize the commenters' request for a blanket exemption from CAM requirements until permit renewal. While no exemption from the currently applicable title V process and CAM requirements is possible, EPA believes that sufficient opportunities exist to synchronize the NSR and title V requirements and processes so as to not significantly impact the overall time line for Tier 2/gasoline sulfur control compliance.

**COMMENT L:** EPA can facilitate the permitting process by either eliminating the need for a PSD permit or by eliminating certain PSD provisions. At a minimum, EPA should eliminate the Class II and Class I increment analyses and the Class I area visibility analysis. (**Louisiana Mid-Continent Oil and Gas Association (IV-D-68), p. 2**)

**RESPONSE:** Absent an available exclusion from NSR, EPA is not authorized to exclude from review those modifications which refineries must undertake to comply with the Tier 2/gasoline sulfur control requirements if such changes would result in a significant net emissions increase in any regulated pollutant. Similarly, it would be inappropriate for EPA to exclude such emissions increases from consideration in the consumption of PSD

increments where the baseline date for the increments has been established. The commenter provided no basis for requesting such an exemption, and EPA does not believe that there are valid reasons why the ambient impacts resulting from emission increases at the refineries should not be subject to all applicable analyses. The increment provisions and requirements for a Class I area analysis are statutorily based and require that PSD applicants demonstrate that their proposed emissions will not cause or contribute to a violation of any PSD increment or an adverse impact on an air quality related value, including visibility.

**COMMENT M:** EPA should consider providing offsets for refining industry based on emission reductions from vehicles. One commenter suggests that EPA should establish an offset set aside of at least 10% of the benefits attributable to fuel reformulation. The remaining 90% of the benefits of the fuel changes would be left, and refiners would not be unfairly penalized for changes that are mandated by federal regulations. **(American Petroleum Institute (IV-D-114), p. 17, National Petrochemical and Refiners Association (IV-D-118), p. 52)** Some commenters suggest that the sulfur reduction rule state explicitly that mobile source reductions attributable to sulfur reduction are to be considered in the determination of overall project impacts (i.e., part of netting). **(Coastal Corporation (IV-D-159), p. 5, Murphy Oil USA, Inc. (IV-D-117), p. 4)**

**RESPONSE:** EPA agrees with the commenters that vehicle emission reductions resulting from the use of low sulfur gasoline can be used as offsets against emission increases at refineries undergoing changes to comply with the gasoline sulfur control requirements. *(See EPA memorandum dated November 8, 1999, titled "1-Hour Ozone Attainment Demonstrations and Tier 2/Sulfur Rulemaking," from Lydia Wegman, Director Air Quality Standards and Standard Division; and Merrylin Zaw-Mon, Director Fuels and Energy Division, to Air Directors, EPA Regions I-X, concerning the states' flexibility to use vehicle emission reductions for offset purposes.)* EPA does not intend to directly provide such offsets, but plans to provide guidance to the States regarding the use of vehicle emission reductions as offsets. Specifically, EPA will provide details about the circumstances under which the reductions resulting from this final rule can meet the Clean Air Act creditability criteria for offsets (e.g., timing, location, federal enforceability).

EPA also does not intend to require States to set aside any specific portion of such available reductions; under the Clean Air Act, States have the primary responsibility for deciding how to utilize emission reductions, and an individual State may elect to devote all of the reductions from this rule to its attainment plan, rather than to offset new emissions. States accordingly may use any portion of the total creditable emission reductions in a particular nonattainment area to offset emission increases caused by changes at refineries to comply with the gasoline desulfurization requirements. EPA estimates that in most nonattainment areas, only a small fraction of the total vehicle emission reductions will be needed for offsets.

The use of vehicle emission reductions for netting purposes is not permitted by the NSR/PSD regulations, since the creditable emission reductions used for netting purposes must be result from reductions occurring at the modified source. [See, e.g., 40 C.F.R. § 52.21(b)(3)(i) (definition of "net emissions increase" includes only increases and decreases occurring "at the source").]

**COMMENT N:** EPA should not allow the use of emission reductions from vehicles using low sulfur fuel as offsets for refinery new source permitting. Refiners should not be allowed to benefit from the investments being made by the automobile industry. **(Alliance of Automobile Manufacturers (IV-D-115), p. 148)**

**RESPONSE:** EPA disagrees with the commenter's opposition to using vehicle emission reductions as offsets. Off-site motor vehicle emission reductions may not be used as creditable emission reductions to allow refineries to "net out" of major NSR, because the regulations specify that only reductions occurring at the same "source" can be used in netting. However, to the extent that Tier 2 reductions meet the criteria for otherwise creditable offsets, the State or local entity responsible for air quality planning has primary authority to determine whether or not to use such reductions for the purpose of offsetting allowed refinery emission increases. These planning authorities should bear in mind that reductions used by a State to demonstrate attainment would not be creditable as offsets, because longstanding EPA policy is that emission reductions cannot be "double-counted," that is, used as NSR offsets where the same reductions are being counted toward the area's attainment demonstration.

EPA intends to provide States with guidance to detail how the reductions resulting from EPA's low sulfur gasoline regulations can be used to meet the Clean Air Act criteria for creditable offsets.

**COMMENT O:** Some of the potential options identified in the proposal for streamlining NSR for the gasoline sulfur program are problematic - i.e. the use of mobile source emission reductions as offsets for stationary sources and waivers for small refiners.

**(STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77))**

**RESPONSE:** EPA believes that it is legally acceptable under appropriate circumstances for States to use the vehicle emission reductions resulting from the use of low sulfur gasoline to offset emission increases, as long as the reductions are creditable (in accordance with the part D requirements for offsets) and are not being used to demonstrate attainment of the national ambient air quality standards in nonattainment areas. EPA will not mandate to States that vehicle emission reductions be used as offsets. Instead, States must decide whether that is the most appropriate use for the reductions. In most cases, EPA anticipates that only a small fraction of the vehicle emission reductions occurring in a particular area will be needed for offset purposes. [See also EPA's responses to Issues 20.1.M and 20.1.N.]

With regard to the commenter's recommendation for waivers for small refineries, see EPA's response to Issue 18.

**COMMENT P:** In addition to streamlining the permitting process for the oil industry, EPA should also provide similar opportunities for the auto industry with respect to the certification of new vehicles. **(Alliance of Automobile Manufacturers (IV-D-115), p. 149)**

**RESPONSE:** As noted in previous responses, EPA does not intend to streamline the permitting process by eliminating any existing requirements or analyses to accommodate refineries which need to undergo modifications to comply with the gasoline sulfur control requirements. Instead, we plan to disseminate guidance and provide technical support, where needed, to help expedite the permitting process.

With respect to the commenter's recommendation about opportunities for the auto industry, EPA addresses the workload of the vehicle program under numerous other Issues in this document. Please see EPA's responses to Issues 2 through 8.

**COMMENT Q:** EPA should strongly encourage permitting agencies to establish streamlined permit processes, such as considering only those public comments that

address the specific refinery changes at issue. **(American Petroleum Institute (IV-D-114), p. 16, Marathon Ashland Petroleum LLC (IV-D-81), p. 36)**

**RESPONSE:** EPA has already described the types of assistance we plan to provide to help States expedite the issuance of NSR permits needed by refineries to meet the Tier 2/sulfur requirements. [See *EPA's response to Issue 20.1.B.*] EPA does not, however, believe that any effort to expedite permits should limit the role of the public or the State in the permitting process. EPA believes that permits should be issued with the full adherence to the public review and comment process, and notes that existing regulations require the consideration of all written public comments received, not a select subset thereof. [See, e.g., 40 CFR 51.166(q)(2)(vi).]

**COMMENT R:** EPA should ensure that the tools that are available to refiners to expedite the permitting process are adequate to ensure compliance. **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Thomas Questions, p. 1; Inhofe Questions, p. 2)**

**RESPONSE:** EPA is now working on the necessary NSR guidance that will (1) help facilitate the selection of BACT or LAER, and (2) provide details about the circumstances under which reductions resulting from EPA's low sulfur gasoline regulations can meet the Clean Air Act creditability criteria for offsets. In addition, EPA is committed to make available special EPA permit teams to provide assistance to both the refiners and permitting authorities when general and individual permitting issues arise.

## **Issue 20.2: Other Permitting Concerns**

**COMMENT A:** The amount of permitting required, coupled with the public comment period/process, administrative hearings and judicial reviews, may lead to a lengthy permitting process. As a result of the number of permits and these procedural requirements, refiners may not be able to implement the necessary equipment modifications and meet the proposed deadline for sulfur reductions. A few of these commenters state that in a normal situation, the permitting process for major projects has taken as much as 18 months. However, the permit "land rush" touched off by the proposed rule would severely complicate matters beyond the normal case, especially in those states with a high number of refineries. All refineries will be operating on the same timetable, with all design/construction occurring at the same time. This will severely strain or exhaust both the regulatory permitting resources in the States and EPA Regions and engineering/construction resources available in the private market. NPRA provides estimates of permit time and resources to document the strain the rule will put on the permit process. Another commenter states that, given the requirements of Title V and most state permitting programs, states are not likely to be able to issue permits in a timely manner as long as new issues of non-compliance continue to be generated. **(Coastal Corporation (Refining and Chemical Division) (IV-F-73), Coastal Corporation (IV-D-159), p. 2-3, Koch Industries (Philadelphia - Day 1) (IV-F-131), Marathon Ashland Petroleum LLC (IV-D-81), p. 37, National Petrochemical and Refiners Association (IV-D-118), p. 44-46, 49, Norco Refining Company (IV-F-20)) (See other letters listed under Comment A.2 that follows.)**

**RESPONSE:** In discussions with EPA, State air pollution control agencies have indicated that they do not anticipate delays in the issuance of NSR permits to refineries, assuming permit applications are submitted by the refiners in a timely manner. [See also *Issue 20.2.C.*] In States where numerous refineries are located, some States have indicated that they are already preparing their permitting staffs for the anticipated work load of permit applications. EPA's commitment to provide advance guidance should help assure that permits can be issued in a timely manner by offering greater certainty to the process.

In addition, EPA's offer to provide real-time assistance, in the form of EPA teams to address permit issues should help alleviate unforeseen problems that could delay the issuance of individual permits. EPA believes that there will be sufficient time for refineries to obtain the necessary NSR permits to comply with the Tier 2/gasoline sulfur control requirements. Of course, it is important that the refiners provide timely submittals of their permit applications. EPA encourages each refiner to communicate with the applicable permitting authority and EPA Regional Office for advance guidance to help expedite the permitting process. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

**COMMENT A.2:** Issues about continuing non-compliance may inhibit the permit process. This concern is heightened because of recent NSR investigatory efforts by EPA focused on debottlenecking issues. Also, EPA has indicated that 70-80 percent of refineries have been found in violation of NSR, NSPS/NESHAP or hazardous waste management requirements. **(Koch Petroleum Group, LP (IV-D-72), p. 10-12, National Petrochemical and Refiners Association (IV-D-118), p. 47-78)**

**RESPONSE:** Continuing widespread noncompliance by petroleum refineries has been an issue of concern to EPA for many years, but we do not believe enforcing such noncompliance will delay Title V permitting. Generally EPA resolves permitting and enforcement issues separately. EPA believes states can permit modifications necessitated

by the gasoline sulfur control requirements while also addressing identified noncompliance in a timely and appropriate manner through the enforcement actions (penalty) and title V compliance plans (injunctive relief).

**COMMENT A.3:** EPA needs to address the process for handling citizen suits, Class I area federal land manager inquiries, and environmental justice issues. **(Exxon Company, USA (IV-D-119), p. 2)**

**RESPONSE:** EPA recognizes the need to meaningfully engage all stakeholders, especially Class I Area Federal Land Managers and local communities, during the implementation phase of the final Tier 2/gasoline sulfur control rules. However, we see no need to develop a special process to deal with citizen suits or Class I Area Federal Land Manager concerns apart from existing procedures. With regard to environmental justice issues, EPA is in the process of developing a strategy for addressing these issues as they arise.

EPA has already taken a number of steps to ensure that issues, relating to potential localized emissions increases from refineries which make significant process changes to meet the requirements of the final gasoline sulfur control rules, are addressed. For instance, in preparation for issuance of today's final decision, we issued a task order to obtain the services of an outside neutral party to conduct interviews with a broad spectrum of stakeholders to explore with them their perceptions and views of issues associated with permitting pursuant to the gasoline sulfur control program. During Phase I of the project, which was completed September 1999, the contractors contacted representatives from selected EPA offices, states, industry, environmental groups, and environmental justice organizations. Phase II of the project, which will be completed in December 1999, will consist of more focused interviews to assess the potential for a collaborative process among stakeholders and to identify what services community groups in particular need to better participate in a potential future permit process.

The goal of the above-mentioned convening process, and other efforts EPA will undertake, is to understand and to ultimately meet the challenges of implementing the portion of the Tier 2 rule that applies to refineries. EPA is anticipating the potential for a concentrated period of permitting activities at refineries nationwide and wants to ensure that these activities will be a success, such that the health and environmental benefits associated with low-sulfur gasoline can be realized in a timely fashion. EPA hopes that stakeholder involvement early in the development of guidance provided for permitting activities pursuant to the final gasoline sulfur control requirements will yield better results for the refineries, the permitting authorities and surrounding communities.

**COMMENT A.4:** Commenter notes all of the various separate and overlapping review periods and opportunities to appeal permit decisions. **(Coastal Corporation (IV-D-159), p. 4-5)**

**RESPONSE:** EPA cannot preclude the filing of an administrative complaint under Title VI of the Civil Rights Act of 1964 and EPA's implementing regulations, 40 C.F.R. Part 7. Further, the Agency cannot determine whether there will be a disparate impact in any particular area until it conducts an investigation of a specific Title VI complaint. Nonetheless, no special provisions for resolving Title VI complaints related to Tier 2 permitting action need to be written because (1) Title VI complaints alleging discriminatory effects from the issuance of a permit are not accepted for investigation until after the permit has been issued and (2) the filing of a Title VI complaint does not stay construction or operation of a facility. Therefore, Title VI complaints, should they arise, should not delay issuance of Tier 2 permits or a refinery's ability to make modifications. Further, for similar

reasons, a Title VI complaint should not interfere with a company's ability to meet the Tier 2 compliance deadlines. Moreover, EPA believes that the likelihood of a Title VI complaint being filed can be reduced by understanding local impacts early in the permitting process and by working with the communities to address their concerns.

**COMMENT B:** EPA should consult State agencies on the issue of permitting for refineries since the implementation of the gasoline sulfur standards (along with other programs such as Title V that require permit approvals/modifications) may create a permitting backlog. **(BP Amoco (IV-D-58), p. 7-8, Marathon Ashland Petroleum LLC (IV-D-81), p. 36-37, Pennzoil-Quaker State Co. (IV-D-128), p. 10, The Coastal Corporation (Refining and Chemical Division) (IV-F-73), Valero Energy Corporation (IV-F-78))**

**RESPONSE:** States have indicated to EPA that industry can, in general, apply and receive NSR permits in time to comply with the final gasoline sulfur control requirements. Success in this regard depends, in part, on the timely submittal of permit applications and on the absence of any major obstacles which may occur on a case-by-case basis. Also, EPA plans to provide guidance and technical assistance where requested to help ensure that permits can be issued in time for refineries to comply with the gasoline sulfur control requirements.

**COMMENT C:** Local/State agencies will be able to complete the permit approval process within the time frame necessary to ensure compliance with the proposed compliance deadlines. **(Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), STAPPA/ALAPCO (IV-D-67), p. 16)**

**RESPONSE:** EPA agrees that permits to refineries undergoing modifications to comply with the final gasoline sulfur control requirements can generally be issued in time for the necessary changes to be made. EPA guidance and special technical assistance will be made available to help bring about such results.

**COMMENT D:** In order to streamline permitting, state-developed gasoline sulfur rules should be discouraged. It is very important to remove pressure in this way from states that are revising their SIPs and contemplating programs to reduce gasoline sulfur. **(American Petroleum Institute (IV-D-114), p. 15)**

**RESPONSE:** *For EPA's response to concerns about state-developed gasoline sulfur rules, see Issue 22.*

**COMMENT E:** EPA should establish a process whereby each Regional Office hosts meetings to bring together federal, state, and local permit officials and refiners to identify permit barriers and solutions. **(American Petroleum Institute (IV-D-114), p. 15, Flying J Inc. (IV-D-151), p. 4)**

**RESPONSE:** EPA plans to hold meetings and workshops, as needed, as part of its implementation oversight of the final gasoline sulfur control requirements. EPA is prepared to form specialized regulatory teams to work with parties interested in pursuing approaches within the current regulatory framework.

**COMMENT F:** EPA should explore further with the fuel industry the possibility of a P/4 flexible permit workshop focused on the permitting of the refining industry arising from the

gasoline sulfur program. **(American Petroleum Institute (IV-D-114), p. 17)**

**RESPONSE:** *See response to Issue 20.2.E.*

**COMMENT G.1:** The process to address environmental justice should be resolved prior to program implementation. Two of these commenters note that environmental justice issues could potentially delay the issuance of permits and, ultimately, whether refiners will be able to meet compliance deadlines. Environmental justice complaints can be filed even after regulatory agencies have determined that all Clean Air Act requirements have been met and permits have been issued. EPA should impress upon states, environmentalists, and community groups the overwhelming environmental benefit of gasoline sulfur reduction compared to the relatively minor impact of refinery changes. EPA should state in the regulation that the mobile source reductions attributable to the sulfur reductions will likely prevent a finding of adverse disproportionate impacts. The agency should commit to a procedure for quickly processing and deciding environmental justice concerns. EPA should provide in the gasoline sulfur regulation an extension of sulfur compliance dates for environmental justice complaint-related delays while the agency resolves the complaint. **(American Petroleum Institute (IV-D-114), p. 17, BP Amoco (IV-D-58), p. 9, Exxon Company, USA (IV-D-119), p. 2, Koch Petroleum Group, LP (IV-D-72), p. 11, Marathon Ashland Petroleum LLC (IV-D-81), p. 37-38, Murphy Oil USA, Inc. (IV-D-117), p. 4) (See other letters listed under Comments G.2 and G.3 that follow.)**

**RESPONSE:** The wide range of stakeholder groups that will potentially be affected by the Tier 2 rule all seem to agree that, on a national level, the overall health and environmental benefits associated with today's action far outweigh any increased emissions at the refinery which may occur. Moreover, because of reductions in tailpipe emissions from vehicles driven in local communities where refineries are located, the Tier 2/gasoline sulfur rule is also expected to achieve significant environmental benefits in most of these local areas. EPA is committed to identifying any areas that may experience local emissions increases as a result of refinery modifications being made to meet the gasoline sulfur requirements of the rule and addressing any issues raised as a result.

**COMMENT G.2:** Individuals or organizations concerned with environmental justice issues can request or file a complaint with EPA up to 180 days after a permit is issued, which may take years to resolve. Because refiners will need to invest a significant amount of resources to reduce sulfur levels, EPA should include a special provision in the rule to address this issue. **(Coastal Corporation (IV-D-159), p. 5, Koch Industries (Philadelphia - Day 1) (IV-F-131), National Petrochemical and Refiners Association (IV-D-118), p. 51-53, The Coastal Corporation (Refining and Chemical Division) (IV-F-73))**

**RESPONSE:** For most areas, we believe potential refinery emissions increases will be very small compared to the Tier 2 vehicle emissions reductions expected in that same local area. EPA does plan to conduct outreach/education activities for communities, states, environmentalists, and other stakeholders to help ensure that the impact of the rule, both nationally and in local communities, is understood by all concerned and to ensure that environmental justice-related concerns are addressed expeditiously, if and when they arise.

**COMMENT G.3:** Since EPA was able to certify under EO 12898 that the rule has no disparate impacts, EPA should prohibit filings of environmental justice claims for permits necessary to implement the rule. **(Louisiana Mid-Continent Oil and Gas Association (IV-D-68), p. 2)**



**RESPONSE:** *See EPA's response to Issue 20.2.A.4.*

**COMMENT H.1:** The permit process may be too lengthy to allow for compliance with the sulfur standard on time. Several of these commenters suggest that EPA should work with the refining industry to design a fast-track approval process to ensure an adequate and continuous supply during the period of adjustment to the new sulfur regulations. Otherwise, some commenters suggest, EPA should provide assurances that noncompliance due to lack of permit approval alone will not be grounds for sanctions under the new standards. Some commenters suggest a provision in the sulfur reduction rules that provides compliance extensions for permitting delays. **(American Petroleum Institute (Philadelphia - Day 1) (IV-F-131), BP Amoco (IV-D-58), p. 8, Citgo Petroleum Corporation (IV-F-33), Countrymark Cooperative, Inc. (IV-D-154), p. 2, Equiva Services LLC (IV-D-168), Exxon Company, USA (IV-D-119), p. 1, Koch Industries (Philadelphia - Day 1) (IV-F-131), Murphy Oil USA, Inc. (IV-D-117), p. 3-4, National Petrochemical and Refiners Association (IV-F-19), Pennzoil-Quaker State Co. (IV-D-128), p. 10, Tesoro Northwest Company (IV-D-91), U.S. Department of Energy (IV-D-121), p. 4, Valero Energy Corporation (IV-F-78), Williams Companies, Inc. (IV-D-53), p. 3) (See other letters listed under Comments H.2 through H.5 that follow.)**

**RESPONSE:** EPA has indicated its commitment to work with refineries and State/local permitting authorities to help expedite the NSR permitting process. EPA assistance will be provided in the form of advance guidance as well as specific technical support on a case-by-case basis. In addition, it will be important for refineries to make every effort to submit their permit applications in a timely manner to increase the likelihood of an expedited permitting process.

With regard to comments recommending compliance extensions for permitting delays, we believe that we have structured the final gasoline sulfur control program in a way that provides sufficient lead time for refiners to meet the compliance dates. As described elsewhere in this document, not all refiners will have to modify their operations before the 2004 compliance date. Thus, more than four years lead time is available to many refiners. This approach to structuring the final rule, combined with EPA's approach to expediting permits, should provide more than ample time for refineries to obtain any necessary permits within the compliance dates. Therefore, EPA sees no need to provide an additional compliance extension for refineries that do not obtain necessary permits in time.

**COMMENT H.2:** As many as 18 types of processing units at a typical refinery could be required to obtain new or revised permits. Multiple permits could be required as a result of the proposed rule. Commenters provide a tabular summary of the units involved and the types of permits/permit changes that may be required. **(Coastal Corporation (IV-D-159), p. 1-3; att., Koch Petroleum Group, LP (IV-D-72), p. 7-8, National Petrochemical and Refiners Association (IV-D-118), p. 31-43)**

**RESPONSE:** EPA acknowledges that some refineries are likely to need major NSR permits before they can proceed with the modifications needed to comply with the gasoline sulfur control requirements. As stated in previous responses, EPA believes that such permits generally can be issued in a timely manner by State permitting authorities. The guidance and technical assistance that EPA plans to provide both States and refineries will help ensure that unreasonable delays are not experienced.

**COMMENT H.3:** Several other existing and new rulemakings that impact the same refinery

processes covered by Tier 2 will be implemented by EPA and the states during the same time frame as this rulemaking. This overlapping of regulations will add additional complexity and unknowns to the permit process. Other rulemakings include sulfur in diesel; NSPS subparts J, VV and QQQ; part 61, subpart FF and part 63, subpart CC; refinery MACT II; urban air toxics; state VOC and NO<sub>x</sub> RACT requirements; and NO<sub>x</sub> and other SIP Calls. **(American Petroleum Institute (IV-D-114), p. 12-13, Coastal Corporation (IV-D-159), p. 3-4, Koch Petroleum Group, LP (IV-D-72), p. 8-9, Marathon Ashland Petroleum LLC (IV-D-81), p. 36-37, National Petrochemical and Refiners Association (IV-D-118), p. 46-47, 50-51)**

**RESPONSE:** Most petroleum refineries are major source emitters of HAP and also release high levels of non-HAP criteria/ambient pollutants. Over the past twenty years, the EPA has developed a number of standards to regulate refinery emissions. Existing standards include part 60, subparts J, VV, and QQQ; part 61, subpart FF; and part 63, subpart CC. These standards have already been implemented and affected units are already included in existing permits. We believe that the refining industry has a good understanding of these regulations and can predict their impact on new low-sulfur gasoline process units.

Likewise, we believe that the refining industry has a good understanding of the SIP program and can predict the impact of SIP measures on new low-sulfur gasoline process units. Under the SIP program, States develop SIPs that include the control measures needed to meet National Ambient Air Quality Standards (NAAQS). The States, rather than EPA, choose what control measures are needed to meet the NAAQS. The NO<sub>x</sub> SIP Call directed certain States to submit SIP revisions addressing those NO<sub>x</sub> emissions from their State that contribute significantly to downwind nonattainment of the ozone NAAQS. As with all SIPs, each State has full discretion to choose any set of controls that would assure the necessary reductions. 63 FR 57,356, 57,378 (Oct. 27, 1998). The deadline for submitting SIP revisions in response to the SIP Call has been indefinitely stayed by the D.C. Circuit. *Michigan v. EPA*, no. 98-1497 (D.C. Cir. May 25, 1999). To the extent a refiner has concerns about the impact a State's SIP measures may have on its new low-sulfur gasoline process units, it may address those concerns to the State. The EPA is currently developing 40 CFR part 63, subpart UUU (refinery MACT II) and working to minimize the complexities of the final standards. To assist the refineries, the EPA has delayed promulgation of the rule to coordinate its implementation and compliance with the Tier 2 fuel standards. In addition, where possible, the EPA is planning to allow previous compliance demonstrations from part 60, subpart J to be used under part 63, subpart UUU.

**COMMENT H.4:** Analysis of emission increases associated with desulfurization indicates that NO<sub>x</sub>, VOC and PM emission increases, from the hydrotreater alone, will be sufficient to trigger major NSR. This means that major NSR will be required at every refinery in the US, and EPA's assessment of permitting time is inappropriate. **(National Petrochemical and Refiners Association (IV-D-118), p. 44)**

**RESPONSE:** EPA indicated in the May 13, 1999 preamble to the proposed Tier 2/gasoline sulfur control rules that the number of refineries nationwide triggering NSR "could be substantial." However, some refineries may have sufficient contemporaneous emission reductions to "net out" of review if they choose to do so. Nevertheless, we will not know with certainty the extent to which refineries will need NSR permits to make the necessary modifications to their existing facilities until actual applications are received. We continue to believe that, given timely submittal of the necessary permit applications, the preparations that States are making and the guidance that EPA is committed to provide, States will be able to review and issue the required NSR permits to enable refineries to make the changes needed to comply with the final gasoline sulfur control requirements.

**COMMENT H.5:** Concerned that the necessary permit rule changes that would allow for permit streamlining are not feasible within the short time period available. Notes that permit concerns only heighten the need for an improved ABT program. **(Phillips Petroleum Company (IV-D-82), p. A15)**

**RESPONSE:** EPA has indicated that it does not intend to propose any changes to its existing NSR regulations in order to help expedite the review and issuance of permits to refineries required to undergo changes to comply with the final gasoline sulfur control rules. EPA assistance will take place in the form of guidance and direct technical support where needed. *See also the response to Issue 20.1.B.*

With regard to the commenter's statement about the need for an improved gasoline sulfur ABT program, *see EPA's response to Issue 17.*

**COMMENT I:** Current efforts to issue initial Title V permits will decrease state agencies' ability to process the NSR permits that will be required, especially in states with a substantial number of refineries. **(American Petroleum Institute (IV-D-114), p. 13-14, Marathon Ashland Petroleum LLC (IV-D-81), p. 37, Murphy Oil USA, Inc. (IV-D-117), p. 4)**

**RESPONSE:** As stated in previous responses, States have indicated their belief that they can issue permits to refineries in a timely manner if complete applications are submitted within a reasonable time frame and no major obstacles arise during the processing/review period.

**COMMENT J:** EPA cannot offer any direct guarantees about permit streamlining because the States, not EPA, act as the permitting authorities. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 9)**

**RESPONSE:** EPA acknowledges that the States and local permitting authorities will be primarily responsible for ensuring that all permits will be issued in a timely manner. However, permitting authorities have assured EPA that they will be able to permit the changes that the refineries expect to make and EPA is prepared to offer special assistance to the refiners and permitting authorities to help address any such problems which may arise. There will be, of course, various factors that must be considered, including the timely submittal of permit applications and the existence of unique circumstances (e.g., Class I area impacts, increment violations) which may require special attention.

**Issue 20.3: Comments contained in October 15, 1999 letter, received after the close of the public comment period, from Richard Drury on behalf of various environmental justice organizations and advocates. (Assigned Docket No. IV-G-35)**

**COMMENT A:** A central goal of the proposed regulation is to allow the refineries to avoid full NSR, thereby locking the affected communities out of meaningful participation in the permitting process, and likely allowing refineries to avoid installing BACT and LAER technology that would eliminate localized emission increases.

**RESPONSE:** The commenter, while citing some specific issues, generally expressed concern that EPA intended to weaken the NSR process—thereby “locking the affected communities out of meaningful participation in the permitting process”—for refineries making changes to comply with the Tier 2/gasoline sulfur control requirements. In response to that general concern, based on the comments and other information we received in the response to the proposal, EPA believes it is not necessary or appropriate to develop options which would exempt refineries from the normally applicable NSR process and applicable requirements. This position is supported by (1) the comments of States that industry can, in general, apply and receive NSR permits in time to comply with the final gasoline sulfur control requirements; and (2) the recognition of industry’s potential ability to use emissions reductions at the source to net projects out of major NSR which would otherwise be applicable. Thus, EPA believes that permits can be issued to refiners in a timely manner under the existing major NSR permitting program.

Accordingly, we do not intend to develop regulations or special policies to exempt from NSR those refineries undergoing modifications to comply with the final gasoline sulfur control program. The type of permit streamlining which EPA now envisions will involve expeditious review and processing of each permit application while satisfying all of the NSR requirements, including opportunity for review and comment by the concerned public. To help expedite the review of each major NSR permit application, EPA will provide assistance with the proper application of the existing NSR rules. Accordingly, EPA intends to provide guidance on the selection of BACT and LAER, and will also provide guidance to States concerning the use of vehicle emission reductions resulting from the use of low sulfur gasoline as emission offsets for refineries proposing to increase emissions in nonattainment areas. The ability to provide these types of assistance exists within the current regulations. Nevertheless, EPA intends that any guidance offered to expedite the permitting process will be subjected to public review and comment before it is considered final.

**COMMENT B:** This rule seeks to decrease public participation in the EPA’s rulemaking process, thereby limiting public access. Public participation is ...also a means to ensure the BACT and LAER is implemented at every refinery.

**RESPONSE:** EPA is in no way shortcutting public participation opportunities in the permitting process. We agree that the public should be given fair opportunities to understand what is happening in their communities. Thus, EPA’s NSR regulations applicable to both major and minor sources require a public participation process. Specifically, States are generally required to provide a 30-day public comment period with an opportunity for public hearing. Moreover, EPA intends to go beyond the required public process; as stated elsewhere, EPA plans to issue guidance—after considering public input on a draft—setting out a level of emissions or controls that will help facilitate the selection of best available control technology (BACT) and lowest achievable emissions rate (LAER) for certain emissions units associated with refinery desulfurization projects. This guidance should not be taken to establish an automatic level of control for all affected refineries. We agree that BACT is a case-by-case selection process which should include consideration of site-specific issues. The public’s opportunity to review and comment on the BACT

determination in each permitting case should help ensure that the BACT selection process remains a case-by-case determination. We plan to make a draft of this guidance available for public review and comment in January 2000.

**COMMENT C:** EPA proposed to reduce automobile pollution that was distributed widely across the nation by increasing pollution in refinery communities, effectively transferring broadly distributed pollution into toxic hot spots in refinery communities.

**RESPONSE:** Current regulations ensure that sources are responsible for the local impacts that result from any increase in emissions resulting from physical or operational changes they make. EPA did not propose, nor are we suggesting in this action, any deviation from these existing requirements for refineries subject to the Tier 2/gasoline sulfur control rules. In nonattainment areas, this means that refineries will be required to obtain offsets for any increase in emissions of a nonattainment pollutant resulting from major modifications at their facilities after the application of any required control technology. These offsets must be in accordance with the NSR requirements of part D of the Act related to creditable emission decreases, and the classification of the nonattainment area (prescribing escalating offset ratios as the severity of the ozone nonattainment area increases.) For example, the emission reductions generally must occur in the nonattainment area where the refinery is located.

In attainment areas, refinery emissions will not be allowed to cause or contribute to a violation of any national ambient air quality standard (NAAQS) or PSD increment. In addition, any potential impacts on Class I areas must be duly evaluated. Finally, EPA regulations guarantee that even minor sources and minor modifications are not permitted if they would cause or contribute to a violation of any NAAQS or applicable control strategy.

With regard to the commenter's concern about "toxic hot spots," the EPA estimates that, even at the local level, in the vast majority of cases, the environmental benefits from the Tier 2/gasoline sulfur control rule will far outweigh the refinery increases expected in that same local area. However, we will not be able to determine with certainty any environmental impacts for a particular community until sources begin to (1) determine what types of modifications are necessary to comply with the requirements of the final Tier 2/gasoline sulfur control rule and (2) determine what types of controls will be required to meet the permitting requirements of the Clean Air Act. The Agency will be addressing this issue on a case-by-case basis as refineries submit information related to the actual emissions increases expected at each individual refinery.

**COMMENT D:** EPA is allowing improper means for polluters to net out of NSR and offset increases.

**RESPONSE:** The commenter has incorrectly implied that EPA intends to alter the regulations allowing sources to "net" out of NSR in order to accommodate refineries making changes to comply with the gasoline sulfur control requirements. No such changes are contemplated. Creditable emission reductions for "netting," as the commenter points out, must be generated by the source from which the proposed emission increase will occur. Off-site motor vehicle emission reductions thus cannot be used to allow a refinery to net out of NSR.

**COMMENT E:** The mobile to stationary source offsetting scheme violates Clean Air Act offset requirements.

**RESPONSE:** EPA disagrees with the commenter's position that the use of vehicle emission reductions as offsets for refinery emission increases violates the offset requirements under the Clean Air Act. EPA has indicated that any vehicle emission

reductions used by States to offset refinery emission increases must meet the offset criteria of the Act. EPA intends to provide guidance to States on the use of vehicle emission reductions resulting specifically from the use of low-sulfur gasoline as creditable emission offsets. This guidance will emphasize the requirement for such reductions to satisfy the statutory criteria for offsets set forth in part D of the Act. Emission reductions that are not considered creditable by the statutory criteria do not qualify as offsets for use by refineries or any other stationary sources.

**COMMENT F:** What are pre-funded offset pools and how will they work?

**RESPONSE:** EPA's reference to pre-funded offset pools relates to otherwise creditable emission reductions secured by the State or local air quality planning authority and set aside for sources to use as offsets. Offsets in a designated pool must meet all statutory criteria for offsets set forth in part D of the Act. Consistent with this general approach, EPA believes that the Tier 2/gasoline sulfur control rules will generate substantial emission reductions as a result of the use of low-sulfur gasoline by automobiles in the areas where affected refineries are located. Accordingly, it may be possible for State or local authorities to use a fraction of these reductions to create a pool to provide the offsets needed by refineries that make major modifications to comply with these rules.

**COMMENT G:** What are "less than significant" increases in emissions?

**RESPONSE:** As explained in footnote 56 (at page 26064) of the preamble of the proposed Tier 2/Sulfur control regulations, EPA's reference to "less than significant" emission increases is a concept that has long been reflected in the existing NSR regulations. These regulations define, for each regulated pollutant, the emissions increase from a physical or operational change that EPA considers "significant" and therefore will trigger major NSR. *See e.g., 40 CFR 52.21(b)(23)(i).* These regulations have not been changed as part of the present rulemaking.

The commenter also stated that "EPA offers no insight as to how it will calculate the baseline by which to measure future increases." Again, this is clearly addressed in the existing NSR regulations, and EPA has no intention of establishing new policy for refineries required to undergo modifications to comply with the gasoline sulfur control requirements. *See e.g., 40 CFR 52.21(b)(3).*

**COMMENT H:** The EPA should implement LAER at most, if not all, participating refineries.

**RESPONSE:** The requirement that a major new or modified source apply the lowest achievable emission rate (LAER) is contained in the nonattainment NSR requirements under part D of the Act. LAER will be applied to those refineries located in nonattainment areas that undergo major modifications to comply with the gasoline sulfur control requirements. However, EPA does not intend to extend this requirement to refineries located in attainment or unclassifiable areas, which are subject to the requirements for prevention of significant deterioration (PSD) of air quality. Under the PSD permitting program, major modifications must apply best available control technology (BACT).

**COMMENT I:** Ambiguous "hardship" relief should not be available to refineries.

**RESPONSE:** The EPA comment relates to EPA's proposed discussion of possible relief from the Tier 2/gasoline sulfur control requirements for small refineries; *see EPA's response to Issue 18 in this Technical Support Document.*

**COMMENT J:** EPA cannot completely exempt certain changes from minor NSR under the

terms of a plantwide applicability limit (PAL).

**RESPONSE:** The commenter questioned EPA's suggestion that PALs could be used to possibly prevent minor NSR from applying to refineries that obtain PALs. Refineries have generally indicated to EPA that PALs would not be useful to address NSR requirements associated with the Tier 2/gasoline sulfur control rules and therefore do not intend to seek a PAL. More importantly, EPA has determined that it would not be appropriate to develop a special PAL policy or any other mechanism to expand the opportunity for exemptions from major or minor NSR to accommodate refineries which must make modifications to their existing facilities to comply with the Tier 2/gasoline sulfur control requirements.

**COMMENT K:** Merging NSR and Title V permitting undermines public participation in Agency action.

**RESPONSE:** EPA does not intend to eliminate any opportunities under the existing NSR and title V regulations for the public to review and comment on either NSR or title V permitting actions to allow for the modifications that may be required at refineries to comply with the Tier 2/gasoline sulfur control rules. The discussion of a merged NSR/title V process in the preamble to the proposed Tier 2/gasoline sulfur control rules was intended to point out the advantages of combining the procedural requirements of the NSR and title V programs. The discussion specifically addressed the importance of continuing to satisfy the requirements of the title V permit revision, permit review, and public participation provisions. To the extent the permitting authority ensures that all federal permitting requirements, both NSR and title V, can be addressed in one public process, there are advantages to the merging concept. Both resources and time are saved for permitting authorities and sources applying for the change by not duplicating efforts. For the public, there are advantages to reviewing both the NSR action and the title V permit revision together rather than separately. Nevertheless, EPA agrees that, in those situations where the requirements of the NSR and title V programs cannot be met under a single public participation process, then additional public participation procedures are required.

**COMMENT L:** Increased sulfur recovery will also result in increased risk of refinery accidents.

**RESPONSE:** The commenter did not provide data to support his position. EPA has no information showing increased sulfur recovery or larger sulfur recovery units will result in increased risks of refinery accidents.

**COMMENT M:** It is unacceptable for the agency to trade off the health of refinery communities in exchange for generalized air pollution benefits. Not only is this result unacceptable, but having state agencies issue permits to implement the program violates Title VI of the 1964 Civil Rights Act, and Executive Order 12898 which prohibits government action having a discriminatory impact.

**RESPONSE:** The EPA agrees that it would be unacceptable to trade off the health of refinery communities in exchange for generalized air pollution benefits. However, we do not believe the Tier 2/gasoline sulfur control rule will cause such an exchange. We estimate that, even at the local level, in the vast majority of cases, the environmental benefits from the Tier 2/gasoline sulfur control rule will far outweigh any increased emissions from the refinery that might occur in that same local area. Nonetheless, EPA recognizes that in some cases, problems may arise and if a Title VI administrative complaint is filed, EPA will review that complaint consistent with its obligations under Title VI and EPA's implementing regulations. In addition, we have developed safeguards (e.g., permit teams, community outreach initiatives, issuance of guidance through a public review

process) intended to address the concerns that residents of refinery communities may have. *Also, see EPA's response to Issue 20.2.G for related information.*

**COMMENT N:** The proposed rule is completely devoid of environmental justice analysis.

**RESPONSE:** Executive Order 12898 requires EPA to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations. In the final Tier 2/gasoline sulfur control rule, we did conduct activities to address environmental justice issues in accordance with the requirements of Executive Order 12898 (i.e., conducted a stakeholder convening process to determine the concerns of the environmental justice community, determined the demographic/socioeconomic status of the refinery communities, evaluated estimates of refinery emissions increases vs. Tier 2 benefits). As a result of these activities, we have developed a process to address environmental justice concerns, if they arise, during the implementation phase of the rule. This process includes activities such as forming permit teams to address citizens' concerns, conducting educational meetings with the affected communities, and issuing BACT/LAER and offset guidance for public review and comment.



## ISSUE 21: COMPLIANCE PROVISIONS

**COMMENT A:** Supports the proposed compliance strategy. Testing for sulfur should be completed both upstream and downstream. However, commenter suggests that the small refiner provisions add some complexity, especially for product transfer documents. Commenter suggests that perhaps the rule should focus only on PTDs for small refiners rather than requiring redesignations of PTDs of large refiners. (**Alliance of Automobile Manufacturers (IV-D-115), p. 151, BP Amoco (IV-D-58), p. 7**)

**RESPONSE:** We agree with the commenter that the gasoline sulfur standard must be enforced at the pump stand. We agree that there has to be effective enforcement downstream to assure compliance at the retail level. See discussion in response to issue 21.B, below.

We agree with the comment that downstream testing and enforcement is important to assure gasoline meets the sulfur standard at the retail level. The quality of gasoline downstream of the refinery gate can be affected by a number of actions, including contamination by high sulfur distillates in pipelines (for example, by blending with transmix) or elsewhere in the distribution system, and by the distribution of less expensive high sulfur blendstocks by unscrupulous parties.

We agree that assignment or determination of the applicable downstream standard through downstream product transfer documents (PTDs) alone would not be effective during the period in which some refiners have different interim standards. The problem arises primarily due to the fact that gasoline from different refineries does not fully mix in pipelines to form a homogeneous mixture. Therefore, small refiner gasoline in pipelines will tend to stay segregated during shipment. A pipeline operator could take a sample from a pipeline shipment that contains small refiner gasoline, and depending on what portion of the shipment the sample is taken from, the test result may show that the gasoline meets the national standard. Under the proposal, the pipeline would have to redesignate the entire shipment as subject to the national standard if the test result showed that the sulfur content was less than the national downstream cap. As a result, one or more terminals receiving a portion of the shipment might receive gasoline not meeting the national standard even though the product transfer document indicated that it was no longer small refiner gasoline.

EPA's solution to this problem addresses pipelines separately from terminals. Where a pipeline receives small refiner product accompanied by a PTD indicating that it is small refiner gasoline not meeting the national downstream cap, the pipeline is allowed to designate the entire shipment as small refiner gasoline, but only if it can support the small refiner gasoline designation with a test result. Under this scheme an entire pipeline shipment may be designated as small refiner gasoline even though typically, in the nation's largest pipelines, less than 5% of the shipment may be small refiner gasoline.

Because small refiner gasoline will account for only a tiny fraction of most large pipeline shipments, under the final rule, all gasoline received by terminals is deemed to meet the national downstream cap unless the terminal receiving the gasoline has a product transfer document designating the gasoline as small refiner gasoline, and a terminal test result that supports the designation. After any subsequent receipt of product into the same storage tank, a terminal operator could not continue to designate the tank as containing small refiner gasoline unless a sample is taken from the tank after such receipt of gasoline and the test result demonstrates the sulfur content of the gasoline continues to be higher than the national refinery level cap. Current reasonably priced field test instruments may be adequate through 2005, when the national cap is 300 ppm. We expect that reliable, more precise, and reasonably priced field test methods for testing the sulfur content of gasoline

will be developed prior to 2006. Therefore, this provision is not expected to greatly burden terminals, many of whom already take quality assurance samples from storage tanks to test for various parameters. Furthermore, we believe many terminals will not frequently receive gasoline designated as small refiner gasoline and may find that sampling after each receipt of gasoline is not necessary.

Retailers, truckers and wholesale purchaser-consumers are not required to test. These parties can demonstrate compliance by maintaining valid transfer documents that demonstrate a terminal has properly classified the gasoline as small refiner gasoline.

**COMMENT B:** EPA should modify the proposed enforcement strategy to mandate compliance at the "refinery gate" (and/or at the point of importation). Every refiner and importer should be required to test and report on every gallon of gasoline produced or imported. Compliance with the proposed gasoline sulfur reductions should be enforced in much the same way as the existing conventional gasoline anti-dumping program. **(Coastal Corporation (IV-D-159), p. 7, Society of Independent Gasoline Marketers of America (IV-F-61), Society of Independent Gasoline Marketers of America (IV-D-156), p. 9)** With the small refiner provisions, intra-refinery averaging, and externally purchased credits, downstream enforcement is impractical. **(Pennzoil-Quaker State Co. (IV-D-128), p. 10)** This approach would eliminate the need for "S-RGAS" designations on product transfer documents (PTDs), which will create significant burdens for all participants in the distribution system. In addition, EPA should eliminate the retailer PTD retention requirements, which EPA correctly notes was dropped from the anti-dumping. **(Society of Independent Gasoline Marketers of America (IV-D-156), p. 9)**

**RESPONSE:** We disagree that an effective enforcement and compliance scheme for the gasoline sulfur program can be fashioned that relies solely on testing at the refinery/importer level. As mentioned in response to Comment 21.A, there is substantial opportunity for gasoline that is in compliance when it leaves the refinery to be contaminated with high sulfur product downstream. The conventional gasoline rule has no downstream standards. This is because the purpose of the conventional gasoline rule (known as the "Anti-dumping Rule") is to require gasoline that is distributed to all non-RFG areas stay as clean as it was in 1990. Under the Anti-dumping Rule, individual refineries are not required to meet a single national standard, but rather are allowed to produce gasoline that complies with that refinery's individual standards based on 1990 levels for various parameters. In contrast, the sulfur rule sets a national standard based on air quality needs and on the significant impact of sulfur in gasoline on the emissions control systems of motor vehicles certified to Tier 2 automobile emissions standards. Thus, unlike the Anti-Dumping Rule, today's gasoline sulfur rule is ultimately aimed at meeting a specific national standard at the retail pump. Therefore, we believe that downstream enforcement is a necessary part of the compliance and enforcement program for this rule. Moreover, we believe downstream enforcement is necessary to assure a level playing field for parties who make significant efforts to comply with the sulfur program. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

We believe that the downstream enforcement scheme finalized today will be effective, even though the rule allows flexibilities for refiners and importers, including averaging and credits. Even with the averaging program, and a temporary program for less stringent standards for some refiners, we believe the downstream enforcement scheme can ensure compliance with the national downstream cap standards, as well as downstream standards for small refiner gasoline.

We do not believe the product transfer document designations of small refiner gasoline are burdensome. Today's rule modifies the proposed rule by allowing the use of brief product

codes for small refiner gasoline designations at all levels of the distribution system. Moreover, most terminals use computers to print product transfer document information, and small refiner gasoline designations can be set to automatically appear on documents, depending on status of the gasoline in a terminal's storage tanks. We do not believe that a requirement to maintain product transfer documents for five years is burdensome. These are commercial documents that would exist regardless of EPA fuels rules. These documents are already required to be maintained by retailers in RFG areas. Most parties in all areas of the country would maintain these documents for several years regardless of EPA requirements because of tax laws and other business purposes.

The product transfer document requirements of today's rule are temporary. They are in effect only for the period that less stringent refinery level gasoline standards are in effect.

**COMMENT C:** Testing downstream (i.e., beyond the refinery gate) would be too costly and is unnecessary. **(Murphy Oil USA, Inc. (IV-D-117), p. 5, Society of Independent Gasoline Marketers of America (IV-F-61))**

**RESPONSE:** The final rule does not require downstream testing by regulated parties but makes quality assurance testing an element of establishing a defense to presumptive liability throughout the duration of the program. As explained in response to Issue 21.(A) and (B), above, pipelines and terminals must test if they are to designate gasoline as small refiner gasoline subject to a less stringent downstream standard than the national standard. Retailers, wholesale purchaser-consumers and truckers are not required to perform such testing.

**COMMENT D:** The legal basis for including a credible evidence provision in the regulations is doubtful. The only provision of the CAA that mentions "credible evidence" is section 113(e), which is limited in application to stationary sources. Moreover, the Act specifically limits the use of credible evidence, even with regard to stationary sources, to determinations as to the appropriate amount of penalties. Section 113 does not authorize EPA to use "any credible evidence" to establish that a violation has occurred. Moreover, there is no mention of "credible evidence" in sections 205 or 211 of the Act, sections applicable to fuels enforcement. Commenters also argue that a credible evidence provision is inconsistent with Congress' fuel enforcement scheme in section 211(k)(5) which requires EPA to establish appropriate measures of and methodologies for ascertaining emission levels. The credible evidence provision is also inconsistent with other parts of the proposal that emphasize the importance of having a single regulatory test method to avoid conflicting results, assure accuracy and assist enforcement. At the least, the provision should provide a presumption that required testing methods prevail, as under the RFG program (80.78(c)). Another commenter argues against the credible evidence provision because it is inconsistent with the RFG requirements at 80.78(c) and thus will create inconsistency and confusion. **(American Petroleum Institute (IV-D-114), p. 134, Marathon Ashland Petroleum LLC (IV-D-81), p. 17-18, National Petrochemical and Refiners Association (IV-D-118), p. 79)**

**RESPONSE:** These issues are addressed in preamble section VI.I.

**COMMENT E:** If EPA includes a credible evidence provision for fuels enforcement, it should impose similar requirements for vehicle enforcement. **(American Petroleum Institute (IV-D-114), p. 135, Marathon Ashland Petroleum LLC (IV-D-81), p. 18)**

**RESPONSE:** All of EPA's regulatory provisions are based on our analysis of the enforcement situations that are to be addressed by those provisions. We have crafted the evidentiary provisions of the sulfur rule based on the enforcement needs of the sulfur program. The vehicle enforcement provisions of the Tier 2 Rule have been created to address the specific, unique needs of that program. The Agency believes that identical evidentiary provisions should not be promulgated for the two programs regardless of the differences between the programs.

**COMMENT F.1:** EPA should eliminate from the Tier 2 rule section 80.390 providing for use of non-reference test methods to prove a violation. A refiner could produce gasoline that meets the new standard and perform every test method known to science to ensure that its gasoline is compliant. However, a downstream facility that does anything to change the properties of the gasoline and only uses the reference test method to ensure compliance could create gasoline that would fail under other test methods used by EPA inspectors. In such a case, the refiner would be liable unless it could claim one of the affirmative defenses in section 80.400. **(Koch Petroleum Group, LP (IV-D-72), p. 30-31)**

**RESPONSE:** The Agency believes the commenter's concern that the Agency's ability to use credible evidence would undermine a refiner's reliance on the regulatory test method, is unwarranted. Since the sulfur rule makes results from the regulatory test method the benchmark against which all other standard compliance evidence must be evaluated, the most efficient use of Agency resources dictates the use of the regulatory method. Hence, the Agency intends to use the regulatory test method, and not alternative methods, in its own enforcing of the sulfur program, unless unusual circumstances would warrant alternative testing. Consequently, the Agency believes it will be reasonable for a refiner to rely on its own proper use of the regulatory test method to determine its compliance since the regulation only allows use of test methods that are shown to correlate to the regulatory method (and to whether the gasoline would meet the standard if tested using the regulatory method). Other commenters provided more detailed comment on this issue. Their comments are summarized below.

**COMMENT F.2:** Cites generally to issues raised in ACE litigation. Also notes that ACE provisions will increase costs because refiners will believe they need a larger margin of compliance given uncertain compliance requirements. Finally, notes that in the Cartage litigation cited by EPA the defendant did not escape all liability as EPA suggests, but rather was found liable under one section rather than a different section. **(Koch Petroleum Group, LP (IV-D-72), p. 31-32)**

**RESPONSE:** The Agency disagrees that the rule's permission to use credible evidence should result in increased costs for refiners due to the need for a greater margin of compliance. We do not believe that the sulfur program's credible evidence provision creates more compliance uncertainty than exists under the other fuels programs. As is consistent with other fuels programs, the sulfur rule establishes the primacy of the regulatory test method in determining standard compliance. Results from other methods may only be used if they relate to the determination of compliance which would have been obtained under the regulatory method. Consequently, as is the case in our other fuels programs, and regardless of the existence of the credible evidence provision, the Agency intends, as a general procedure, to use the appropriate regulatory test method to make our determinations of sulfur standard compliance. Other methods may only be used if they are shown to be relevant to whether the gasoline at issue would meet the standard if tested using the regulatory test method.

Further, the Agency does not agree with the commenter's argument that the use of

credible evidence is unnecessary in the sulfur rule since the *Cartage* case, which the credible evidence provisions were designed to address, actually included a determination of liability not based on the use of credible evidence. While it is true that liability in the *Cartage* case was determined for a small number of violations without reliance on credible evidence, liability was not found for the vast majority of the *Cartage* violations which required the use of alternative evidence to be established. Therefore, contrary to the assertion of this commenter, the Agency believes the *Cartage* case actually affirms the Agency's need for credible evidence to effectively enforce the fuels regulations.

One commenter incorporates by reference industry comments in EPA's rulemaking establishing credible evidence provisions under Section 113 of the Act. In general, those comments raised the following issues: (1) Section 113 does not authorize the credible evidence provisions at issue, (2) because the compliance test method is inextricably linked to the stringency of the standard, the impacts on the underlying standard of different compliance test methods must be fully evaluated, (3) compliance determinations are an inherent part of emissions standards under the Clean Air Act, and changing the method for determining compliance with a standard can affect the validity of the standard, (4) the credible evidence provisions will create vague and undefined standards, (5) by allowing the use of other test methods, regulated entities' exposure to enforcement will increase, (6) the credible evidence provisions are unnecessary for effective enforcement, (7) the provisions create an increased burden to keep and review records, and (8) the provisions will create a disincentive to the voluntary collection of data by regulated entities.

EPA has included in the docket for this action its responses to comments for the rulemaking under Section 113. The comments in that action that question EPA's authority under Section 113 are not relevant to today's action, since the sulfur program is not promulgated under that section of the Act. In addition, certain other comments in the Section 113 rulemaking are not relevant to today's action because they relate to specific elements of that rulemaking that are not at issue here. For example, comments in that action raised specific test method elements as inappropriate and inconsistent with other EPA regulations, and questioned whether the underlying standards envisioned compliance at times other than when performance tests were conducted.

In response to the comments suggesting that the use of different test methods could increase the stringency of the underlying standard, EPA notes that methods other than the regulatory test methods can only be used if they are shown to be relevant to compliance as measured through the regulatory test method. Therefore, the underlying sulfur standard remains the same, and compliance with it is determined either through the regulatory test method, or through another method that relates to whether the standard would be met through the regulatory method. Thus, the credible evidence provision in today's action does not make the sulfur standard more stringent, nor does it change the method for determining compliance with the standard.

EPA also disagrees that enforcement exposure will increase. The credible evidence provision does not affect EPA's authority to enforce the standards under the Act. In general, the Agency would exercise its enforcement discretion to bring actions where the available evidence is sufficient to show a violation. In addition, EPA notes that the credible evidence provision does not create any additional obligations on regulated entities to create or keep records.

We do not believe there is a disincentive to voluntarily monitor compliance. Both EPA and regulated parties can use other test method data, if it relates back to the regulatory method. Section 80.330 of today's rule specifically allows alternative methods for quality assurance testing and for determination if gasoline containing S-RGAS can continue to be classified as S-RGAS, so long as the method is an ASTM method, the party follows its

protocols, and the method has been correlated to the designated method. This may allow regulated parties to use more portable and less expensive test methods for quality assurance testing. Performing quality assurance testing can establish a necessary element to presumptive liability, and it can be useful in avoiding violations. Where violations are found, they can be corrected and potential liability can be reduced.

**COMMENT G.1:** Imposing liability for causing another to commit a violation adds another, unlawful dimension to the existing presumptive liability scheme (see 80.385 and 80.395). First, Congress did not intend this when it passed the Act. Second, even if Congress did intend this form of liability, EPA should respect the constitutional prohibition against double jeopardy. Third, imposing this form of liability plainly extends the limits that Congress placed on liability for violations under section 211(d) of the CAA. One commenter also noted that the lack of guidance in the rule or preamble regarding what it means to cause someone to violate the rules or to cause non-conforming gasoline to be in the distribution system is arbitrary and capricious action under section 307(d)(9)(A) of the Act. **(American Petroleum Institute (IV-D-114), p. 135-136, Koch Petroleum Group, LP (IV-D-72), p. 28-30, Marathon Ashland Petroleum LLC (IV-D-81), p. 18-19) (See other letters listed under Comments G.2 and G.3 that follow.)**

**RESPONSE:** We disagree with the comment that the Clean Air does not give EPA the authority to establish causation violations under the sulfur rule, or extends the limits that Congress placed on liability for violations under section 211(d) of the Act. These issues are discussed in detail in preamble section VI.H. The other issues are discussed below.

We disagree that the prohibition against causing another entity to violate the sulfur regulations subjects any regulated parties to double jeopardy. First, the double jeopardy clause of the Constitution prohibits multiple criminal prosecutions or punishment for the same offense. It does not prohibit separate proceedings seeking civil and criminal sanctions with respect to the same action.<sup>2</sup> Although the double jeopardy clause has been interpreted to cover monetary penalties in some instances, the Supreme Court has held that penalties intended by Congress to be "civil" would not be found to constitute punishment for double jeopardy purposes absent the clearest proof that the penalty scheme is punitive in purpose or in effect. *See, e.g., Hudson v. United States*, 522 U.S. 93 (1997) (monetary penalties and debarment from further participation in insured deposit institutions are civil penalties that do not constitute punishment for double jeopardy purposes, even where such penalties and sanctions are intended in part as a deterrent).

There is no "clear proof" that the penalty provisions of section 211 of the Act are punitive in purpose or in effect. The *Hudson* court stated that the question of whether a particular punishment is criminal or civil is, "at least initially, a matter of statutory construction," and the first consideration is whether Congress has indicated "a preference for one label or another." *Id.* at 99. In Section 211, as in the statute at issue in *Hudson*, Congress explicitly labeled the penalty provisions as "civil." An examination of other factors considered in *Hudson* supports a conclusion that there is no evidence Congress intended Section 211's civil penalty provisions to be punitive measures. First, the monetary penalties do not involve an "affirmative disability or restraint," such as imprisonment. Second, monetary penalties have not historically been viewed as punishment. Third, the penalties are not assessed only upon a finding of scienter, but rather can be assessed upon a finding of a

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<sup>2</sup> The double jeopardy clause provides that no "person [shall] be subject for the same offence to be twice put in jeopardy of life or limb." U.S. Const., Amd. 5.

violation, regardless of the party's state of mind.<sup>3</sup> Fourth, the fact that the conduct at issue may also be considered criminal is insufficient to render the monetary penalties criminal punishment. Finally, the fact that the Section 211 penalties may be intended to serve to deter others from the same actions is similarly insufficient to render the monetary penalties criminal punishment. See *Id.* at 104-105 for a discussion of these factors.

Thus, the "same offense" analysis in *Blockburger* is not relevant to the prohibited acts provisions of today's regulation, since that case addressed whether two separate criminal counts could be brought based on a single act of selling narcotics. In any case, even under an analysis such as that in *Blockburger*, the prohibited acts of violating the sulfur regulations and causing another to violate the regulations do not constitute the same offense, since EPA would have to show an additional element to demonstrate that an upstream party caused another to violate the regulations. For example, a refiner may violate the prohibition against introducing into commerce gasoline that exceeds the refinery per gallon cap by sending gasoline with sulfur levels above the cap from the refinery into the distribution system. To show such a violation, EPA would have to demonstrate that such gasoline did in fact leave the refinery. However, to show that the high sulfur gasoline caused a downstream party to violate the regulations, EPA would have to demonstrate that the refiner's gasoline reached that downstream party and was not corrected (an additional element that would not need to be shown in finding a violation of the refinery per gallon standards). Thus, even if the double jeopardy clause were applicable to the prohibitions at issue here, the "same offense" analysis shows that violating the regulations and causing another entity to violate the regulations are not the same offense.

In response to the comment that the Agency's action is arbitrary and capricious because it lacks guidance regarding what it means to cause someone to violate the rule or cause non-conforming gasoline to be in the distribution system, the commenter is directed to the preamble to the final rule (section VI.). We believe, however, that there may be other situations in which a party could violate the causation provisions, and that it would be difficult, if not impossible, to designate in the regulations or the preamble all situations in which a party could violate these provisions. As a result, we believe that causation must be evaluated on a case-by-case basis. As with other presumptions of liability under the regulations, where the Agency finds a presumption of liability for violating the causation provisions, the party may rebut the presumption by establishing through affirmative defenses that he did not cause the violation.

The final rule, however, modifies the proposal to specify the regulated parties who may be subject to liability for causing a violation of the sulfur rule. As proposed, the regulation would have applied to any person, not limited to the parties in the gasoline distribution system whose actions could logically have caused the nonconformity. This provision would have potentially broadened the range of liable parties under the sulfur beyond the range established under other fuel programs. The Agency believes that the presumptive liability schemes of current fuels regulations have generally been effective, and finds no compelling reason to apply the regulatory provision at issue to "any person" rather than to specific parties. Therefore, in the final sulfur rule, the liability sections for the causation violations will specify the regulated parties subject to the liability, and will not encompass unspecified parties. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

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<sup>3</sup> The fact that EPA may consider the party's state of mind in determining the amount of penalty that is appropriate is not relevant to this analysis, since penalties may be assessed even in the absence of a finding of bad faith. See *Hudson*, 522 U.S. at 104.

**COMMENT G.2:** In addition, the provisions are unnecessary because the presumptive liability provisions already provide ample authority to hold many different parties liable for any violations. One of the commenters states that the provisions are also unnecessary because there is a business penalty (loss of goodwill) to supplying non-compliant RFG that will inhibit refiners from violating these provisions. Finally, the commenter argues that the result of these provisions is to dramatically increase the number of violations that the initial act represents (for instance, supplying non-compliant RFG to 100 independent stations would result in causing an additional 100 violations in addition to the underlying violation of supplying the non-compliant RFG in the first place). Another commenter argues that because this provision is inconsistent with the RFG and CG compliance provisions, it will only cause confusion and is unnecessary. **(Koch Petroleum Group, LP (IV-D-72), p. 29-30, National Petrochemical and Refiners Association (IV-D-118), p. 79)**

**RESPONSE:** We disagree with the comment that the sulfur rule's liability provisions are unnecessary and that they will only cause confusion because they are inconsistent with the liability provisions under current fuels programs. The majority of the current fuels programs, like the sulfur rule, contain liability structures which impose presumptive liability on parties in gasoline distribution system who, through their actions, could logically have caused the fuel nonconformity (such as the refiner, reseller and distributor). The sulfur rule's liability provisions are thus consistent with the liability schemes of typical current fuels programs. While EPA has the authority to issue notices of violations to multiple parties for violations under current fuels programs, the Agency believes it is appropriate to include in the sulfur rule provisions which explicitly state that causing another party to violate the regulations and causing non-complying gasoline to be in the distribution system are prohibited acts. Rather than create confusion, we believe that including provisions which explicitly address liability for causation will make the scope of liability clearer under the sulfur rule than under the current fuels regulations. Although we do not disagree that there may be a "business penalty" associated with supplying non-compliance gasoline that will serve to inhibit refiners from violating the sulfur provisions, we believe that effective enforcement also requires a clearly defined regulatory liability scheme that will serve as a deterrent to committing violations for parties throughout the gasoline distribution system. Further, without effective enforcement, there may not be any business penalty. We believe that the liability provisions under the sulfur rule provide such a scheme.

We also disagree that the causation violations under the sulfur rule would impose unjustifiable, multiple liability for the commission of a single prohibited act. The Agency is generally not in the best position to know the exact cause of a gasoline nonconformity since so many parties and actions are involved with the sale and transfer of the gasoline. Therefore, for effective enforcement, we must have the ability to assert the liability of all the parties in the system who were connected with the nonconforming gasoline because they each could have caused the violation. Similarly, we must also have the ability to assert upstream liability for the full number of downstream violations a party may be responsible for causing, even if the multiple downstream violations may all ultimately be found to stem from one gasoline sale or transfer on the part of the upstream party. The enforcement possibility does exist that the separate downstream violations may each have stemmed from separate actions by that party.

As discussed in the response to 21(G)(1) above, any party may rebut the presumption of liability for each asserted violation by establishing through affirmative defenses that it did not cause the violation. Moreover, any party against whom EPA institutes an enforcement action may raise equitable factors about its own conduct as part of settlement or the penalty phase of the violation enforcement action. The Agency has typically taken into account such matters as the volume of nonconforming product that a party was connected with, and the severity and the amount of proscribed activity that the party was actually involved with in causing the violation. We do not believe that either the sulfur rule's liability



scheme or its future implementation will be arbitrary or unjustified.

To further alleviate commenters' concern about potential liability for multiple violations under the sulfur rule, we want to clarify that the Agency does not ordinarily attempt to collect separate penalties from an entity for the array of possible standard violations (*e.g.*, both for the manufacturing and the selling of noncomplying product), that a party might be liable for in respect to the same gasoline. In addition, we do not intend to seek penalties from a single party for violating regulatory standard requirements while also seeking penalties for that party's causing of other entities to violate regulatory standard requirements, where both violations involve the same gasoline, unless very unusual circumstances exist which would warrant such action, such as egregious conduct on the part of the party.

In a similar fashion, we do not expect to collect penalties from one party for both type of causation violations for the same amount of gasoline under normal circumstances. A primary Agency purpose in defining the causation violations as two separate prohibited acts (*i.e.*, causing another to commit a violation, and causing the presence of nonconforming product in the distribution system), was not to collect a double penalty, but to address different scenarios of evidence collection. For example, if the Agency finds a sulfur rule standard violation in a sample from a retail outlet supplied by a certain distributor, but we do not have a nonconforming sample from the distributor, the evidence would most easily permit us to assert that the distributor was responsible for causing the retailer violation that we do have evidence for. It is reasonable for us to assert the causation violation against the distributor in spite of our lack of a sample from the distributor, because any distributor who transfers gasoline to a retailer, which gasoline is found to be noncompliant, could logically have caused the noncompliance of the gasoline when it was under the distributor's control, such as by blending high sulfur blendstock into the gasoline.

On the other hand, if we have a violation sample from a distributor, but no samples from its downstream customers, we could most easily assert that the distributor caused the presence of nonconforming gasoline in the distribution system, rather than assert that the distributor caused another party to sell nonconforming product, since we don't have a nonconforming sample from another party's facility. It would be reasonable for us to assert that the distributor caused the presence of nonconforming gasoline in the distribution system since we do have a sample of nonconforming gasoline from the distributor, and provided also that there is evidence that the distributor had sold, transferred, etc. this product to downstream customers.

In summary, the Agency intends to enforce the liability scheme of the sulfur rule in the same reasonable manner that we have enforced the similar liability schemes in our prior fuels regulations. This does not include attempting to penalize a party for multiple variations of noncompliance in regard to the same gasoline unless unusual circumstances make such action appropriate.

**COMMENT G.3:** Commenter only states generally that the vicarious liability provisions in 80.385, .390, .395, and .400 are unworkable. (**Pennzoil-Quaker State Co. (IV-D-128), p. 10-11**)

**RESPONSE:** See discussion on liability for causation in response to Comments 21.G.1 and G.2, above. The commenter believes that, while a presumptive liability scheme has been used in other fuels programs, it is unworkable for the sulfur program because of the flexibilities built into the sulfur program until 2008, including small refiner standards, refiners using intra-refinery averaging and refiners who comply using externally purchased

credits. The commenter proposes that EPA only measure compliance at the refinery gate until there is a single nationwide standard. The commenter adds that currently there is no portable and reliable field test method for testing sulfur in gasoline downstream of the refiner. These additional points raised by the commenter is covered in Comments 21.A and B, above. As noted there, even in the early years of the program, downstream standards and prohibitions exist and a presumptive liability scheme is appropriate for enforcement of those standards and prohibitions for the same reasons it is appropriate when a single nationwide standard exists.

**COMMENT H:** Opposes an independent sampling and testing program and believes the provision of antidumping already established is adequate. **(American Petroleum Institute (IV-D-114), p. 137)**

**RESPONSE:** The NPRM did not propose an independent sampling and testing program for the sulfur program, but merely asked for comments on it. EPA has decided not to adopt such a program.

**COMMENT I:** RFG regulations currently address sample retention and there is no need for the current RFG procedures to change. Thus, EPA should edit section 80.335(a) to exclude RFG. In addition, there is no need to retain and forward batch samples for CG, at least until October 1, 2003, and section 80.335(a) should be edited appropriately. These sample retention requirements are a significant extra burden, especially for small refiners. Instead of this provision, suggests that EPA rely on its own sampling program and downstream QA programs. Another option would be to require the refiner to make available to inspectors samples from the last 2-3 batches, which would alleviate storage concerns. If the requirement is retained, commenter argues that EPA must address sample retention for blendstocks such as butane, which require specialized storage and shipping containers. **(National Petrochemical and Refiners Association (IV-D-118), p. 80)**

**RESPONSE:** The Agency disagrees that sample retention for RFG is unnecessary in the sulfur control program, but does agree that the RFG rule's sample retention requirements have been effective for that program and should also be effective for the sulfur program. Therefore, the final sulfur rule requires all refiners, including those producing RFG, to comply with the sulfur rule's retention requirements. However, any refiner of RFG using an independent laboratory pursuant to 40 CFR § 80.65(f), either under the 100% Option or the 10% Option, will be considered to be in compliance with the sulfur rule's retention requirements provided the refiner ensures that the independent laboratory conducting the retention program for the refiner, is in compliance with these requirements. In particular, the refiner must ensure that its independent laboratory sends the appropriate certificate analysis along with any sample forwarded to EPA. Under the RFG program's 100% Option, the refiner must ensure that its independent laboratory sends the independent lab's certificate of analysis; and under the 10% Option, the refiner must ensure that its independent laboratory sends the refiner's certificate of analysis.

The Agency disagrees with the commenter suggestion that the sulfur program's sample retention and submission requirements should be totally deleted in regard to CG, or at least in the early credit generation period, when sulfur cap requirements will not yet be in effect. The Agency believes that the sulfur program requires accurate refiner testing of all gasoline - both RFG and CG - to promote consistent compliance of all gasoline with the sulfur rule requirements, including both the averaging and cap requirements.

Since the rule requires accurate refiner sampling and testing of CG, the ancillary requirements of sample retention and submission to EPA are being imposed as a means

of promoting that accuracy. Agency enforcement experience under the RFG rule reveals that some refiners' testing procedures are not always reliable in measuring parameters and detecting noncompliance. The sulfur rule's sample retention and submission requirements will enable EPA to verify refiners' results, expose possible refiner testing problems, and thus facilitate greater compliance. Since the early credit generation period will have some required sulfur testing of CG composite samples for those refiners generating early credits, EPA's ability to verify the accuracy of the testing of the composite samples of these refiners, through the program's sample retention and submission requirements, is also necessary during this time.

EPA does not believe that relying solely on our own sampling and testing program would be as effective as also including a refiner sampling and testing program within our enforcement scheme. We believe that requiring a refiner to sample, test, and retain its own samples, which EPA could then test at any time, will provide a useful incentive to greater testing accuracy on the part of refiners. Refiners know that EPA inspections for sampling and testing are sporadic, while the refiner sampling requirements will create a regularity of potential EPA oversight. Further, the rule's refiner sampling and retention requirements will provide EPA with oversight capability for a greater time frame and production volume than would occur if sporadic EPA inspections were the only source of review. The Agency does not believe that the refiner sampling retention requirements will prove a financial burden to a significant number of refineries, since it is our understanding that many refiners already retain their testing samples for their own quality control purposes.

The Agency rejects the commenter suggestion that we merely require sample retention from the last 3 batches of CG produced, in place of the thirty day retention period originally proposed. We do not believe that retention of samples from only the last three batches of gasoline produced will be effective in accomplishing the goal of promoting greater testing accuracy. Three samples could not realistically demonstrate whether refiner testing inaccuracies exist, or whether they continued over a period of time. Consequently, EPA has established a sample retention requirement including a larger number of samples to be retained, but a shorter period of retention (retain the last 20 samples or retain each sample three weeks, whichever results in longer retention), to substitute for the commenter's suggested three batch retention requirement. This number of samples and sample time frame should provide some realistic indication of the validity of the refiner's testing process, while at the same time not requiring refiners to retain batch samples for the thirty day time frame initially proposed.

The Agency agrees with a final commenter concern, that the appropriateness of a sample retention requirement for blendstocks, such as butane, which require specialized storage and shipping containers, needs to be analyzed separately. We have separately considered this issue, and have determined that, because of the unique handling requirements for pressurized blendstock like butane, such blendstocks should not be subject to the rule's sample retention and submission requirements. We agree that there are legitimate concerns about the safe and efficient handling, storing, and shipping of such samples. Further, we also believe that the final rule's quality assurance testing requirements and the testing requirements for blendstock suppliers provides adequate assurance of the compliance of these blendstocks. Consequently, the final sulfur rule deletes the sample retention requirements for these blendstocks.

**COMMENTS J and K:** Commenters support continued use of ASTM D 2622 and some of these commenters suggest that measurements below 10 ppm be reportable as zero or not detectable. Commenters also support use of ASTM D 5453 and/or D 4054 as alternatives. Another option for values less than 10 ppm would be to require D5453 in those

circumstances if EPA believes exact quantification is necessary. Other options include D3120 and D6428.

Commenters also state that the proposed rule includes ASTM D2622 (WDXRF) as the primary test method for sulfur, which has questionable performance at low sulfur levels. EPA should instead establish D5453 (UVF) as the primary test method for sulfur in fuels. The use of D5453 (UVF) provides increased application flexibility, eliminates the issue of test method bias, and provides a more accurate determination of sulfur. The use of D5453 may allow for significant capital savings while providing a better measurement tool. The ASTM Test Method for Sulfur, D 5453 is a modern oxidation/fluorescence technology, is an excellent analytical method, and is already widely used in the petroleum community. In markets where 30 ppm average - 80 cap gasoline is already mandated (California), D 5453 technology has consistently proven to be equivalent and superior to D 2622 technology for the measurement of low sulfur level fuels. D 5453 should be designated as the primary method because it can readily analyze sulfur levels below 15 ppm and has the analytical range to provide equivalent sulfur results in higher concentration fuels. D 2622 should be designated as the alternate method because its results can be unreliable at lower sulfur concentrations. Also, with respect to the cost of ASTM D 5453 as compared to the current regulatory test method ASTM D 2622, many laboratories and refineries already employ the use of D 5453 analyzers and this technology has a much lower operational cost and is a very economical alternative to D 2622. Antek provides significant discussion regarding this issue and provides the following as supporting documentation: Summary of public hearing testimony; and ASTM D5453 Fitness for Use Study, ASTM Research Report D.02-1456, dated February 23, 1999. **(Alliance of Automobile Manufacturers (IV-D-115), p. 152, American Petroleum Institute (IV-D-114), p. 136, Antek Industrial Instruments, Inc. (IV-F-15), Antek Industrial Instruments, Inc. (IV-F-58), Antek Instruments, Inc. (IV-D-61), all pages, Marathon Ashland Petroleum LLC (IV-D-81), p. 16-17, Phillips Petroleum Company (IV-D-82), p. A17-18, San Joaquin Refining Co., Inc. (IV-D-109), Sunoco, Inc. (IV-D-73), p. 30-31)**

**RESPONSE:** We have addressed these issues in detail in the preamble, section VI.

**COMMENT L:** ASTM D2784, D4468, and D3246 should be acceptable for determining sulfur in butane. In addition, one commenter states that EPA should accept the use of D3277-92 with x-ray finish rather than titration finish as a suitable alternative. Commenters state that any of these methods would be just as reliable as ASTM D5623-94 for the determination of the sulfur content of butane. At least, EPA should continue to allow the use of D2784, 4468 or 3246 for quality assurance testing of the butane supplier's sulfur content. **(American Petroleum Institute (IV-D-114), p. 137, Koch Petroleum Group, LP (IV-D-72), p. 33, National Petrochemical and Refiners Association (IV-D-118), p. 81-82, Phillips Petroleum Company (IV-D-82), p. A18-19)**

**RESPONSE:** We have addressed these issues in detail in the preamble section VI.

**COMMENT M:** New procedures for handling butane added to gasoline will require considerable paperwork without providing any observable benefit. **(Koch Petroleum Group, LP (IV-D-72), p. 33-34)**

**RESPONSE:** We disagree. The alternative procedures for butane testing where butane is blended to previously certified gasoline (PCG) are not required to be used. Any refiner who desires to use the regulatory procedure under the RFG rule may do so. This involves testing the previously certified gasoline for sulfur content and testing again after the butane

is blended. The sulfur content and volume of the PCG is then subtracted to arrive at the sulfur content and volume of butane for reporting purposes. The alternative compliance method is designed to offer a less expensive means of complying with the testing requirements for refiners who primarily produce gasoline by blending butane to PCG. The alternative method allows butane blenders to rely upon the test result of the butane supplier so long as the butane blender performs periodic quality assurance testing. We received no negative comment on this provision from parties whose business is primarily or wholly that of butane blending.

**COMMENT N:** The most significant problem with EPA's proposed compliance testing program is that it effectively builds in a commercial bias in the downstream distribution against higher sulfur, small refiner gasoline. Small refiner gasoline is sold to a great extent via the larger pipeline and retail distribution systems (i.e., at wholesale). Under the proposed downstream enforcement program, pipeline systems and marketing terminals would be forced to accept liability for "off-spec" products. This shifts the compliance burden from refiners and importers to the pipelines and terminals. EPA's proposed enforcement program could require pipelines and terminals to conduct numerous tests for small-refiner-associated gasoline on a daily basis. Compliance would become a moving target. There are also significant technical problems with downstream enforcement related to EPA's ability to "backtrack" potential violations to their source. One example is non-ideal mixing in so called "fungible streams" related to normal operational variability in pipelines and terminals. **(Murphy Oil USA, Inc. (IV-D-117), p. 5-6)**

**RESPONSE:** We do not believe that the proposed downstream compliance program would build in a bias against small refiner gasoline. It was designed to provide a method for tracking small refiner gasoline to allow monitoring compliance with both the national downstream standard and downstream standards associated with small refiner gasoline. Today's rule has modified the proposed tracking scheme, as discussed in response to Issue 21.(A) and (B), above. We believe the modified scheme will build no bias against small refiner gasoline. It does not require segregation of small refiner gasoline, and it allows fungible gasoline to be subject to a downstream standard based on the least stringent small refiner gasoline sulfur content applicable to any small refiners' gasoline in the pipeline shipment or terminal storage tank, if certain conditions are met. The downstream standard is computed by determining the ASTM reproducibility for the small refiner's tested gasoline sulfur level, and adding the reproducibility figure to the sulfur level. We do not believe this results in a shifting of the burden of compliance to pipelines and terminals or that compliance is a moving target. The national downstream standard is 326 ppm in 2004 and 2005, and 95 ppm thereafter. Pipelines and terminals receiving small refiner gasoline have a less stringent standard to meet if any small refiner gasoline is in the pipeline shipment or in a terminal storage tank. *I.e.*, to the extent small refiner gasoline present in the distribution changes the compliance target, it is a target that in most cases will be much less stringent than the bulk of the gasoline that a pipeline or terminal will actually have in a pipeline shipment or tank, because small refiner gasoline will only make up 1% to 5% of most pipeline shipments. In some areas of the country, the percentage will be higher but the terminals and pipelines will get the benefit of the least stringent downstream standard applicable to any small refiner gasoline in the shipment or tank. The rule only requires that a pipeline or terminal must have PTDs indicating the presence of small refiner gasoline and the applicable standard, and a test result that confirms the presence of small refiner gasoline.

**COMMENT O:** EPA should not require retention of conventional gasoline samples. **(Flying J Inc. (IV-D-151), p. 5, Koch Petroleum Group, LP (IV-D-72), p. 32)**

**RESPONSE:** This comment is addressed in EPA's response to Comment I in this Issue 21, above.

**COMMENT P:** EPA should eliminate the requirement to test every batch of gasoline for sulfur prior to shipment from the refinery. If left unchanged, this provision would significantly affect analysis costs, inventory costs, pipeline operation performance, and could cause significant delays in product transit times. Not all refineries run the sulfur analysis on-shift or even at the refinery due to the cost of analytical equipment and specialized training. Therefore, the requirement to test every batch for sulfur would require additional equipment purchases, additional laboratory technicians for testing, and slowdowns on product shipments. Another commenter states that prior to September 30, 2003, there is no need to test each batch. Composite samples collected and tested under the anti-dumping portion of the regulations should be sufficient for early credit generation. Another commenter stated that testing each batch of sulfur may be acceptable, but not batch testing of other parameters such as benzene, aromatics and olefins because of the complexity of tests for those parameters. Finally, a commenter notes that sample composites would be allowed in 2000-2003 under the proposal; EPA should extend that procedure to future years to contain cost. **(Fina Oil and Chemical Company (IV-D-152), p. 4, Flying J, Inc. (IV-D-151), p. 4-5, Marathon Ashland Petroleum LLC (IV-D-81), p. 16, Ultramar Diamond Shamrock Corp. (IV-D-75))**

**RESPONSE:** This issue is discussed in preamble section VI.

**COMMENTS Q.1 - .2:** Supports providing the full reproducibility of ASTM 2622-98 for downstream enforcement tolerances. Other commenters state generally that the downstream standards in section 80.210(b) should recognize full ASTM reproducibility. One commenter urges EPA to use this approach for all of the enforcement tolerances described in OECA letter to NPRA of 2/19/99. Based on the same reasoning, another commenter suggests that EPA define appropriate downstream enforcement standards of 325 ppm and 205 ppm when the cap is at 300 ppm and 180 ppm, respectively. **(American Petroleum Institute (IV-D-114), p. 152, BP Amoco (IV-D-58), p. 7, Koch Petroleum Group, LP (IV-D-72), p. 33, Marathon Ashland Petroleum LLC (IV-D-81), p. 19, Tosco Corp. (IV-D-111), p. 8)**

**RESPONSE:** The downstream standards finalized today do represent ASTM test reproducibility. The downstream cap that attaches to the 300 ppm national refinery level cap in 2004 and 2005 is 326 ppm. The downstream cap that attaches to the national refinery level cap of 80 ppm effective 2006 and beyond is 95 ppm. The downstream cap for small refiner gasoline that has a sulfur content that exceeds the national refinery cap standard is the actual sulfur level of the gasoline as tested at the refinery, plus ASTM reproducibility.

**COMMENTS R.1 - .2:** The proposed rule should adopt the in-line blending method present in the RFG. As the Agency is aware, in-line blending is the most modern of blending methods, whereby gasoline is moved out of the refinery as the batch is prepared. Therefore, it is not possible to have a finished sample "prior to the gasoline leaving the refinery," as proposed in the rule. The finished sample is available only after the batch is completed, and when practicing in-line blending this occurs after much of the batch has been shipped from the refinery. Therefore, commenters recommend that the language at 80.330(a)(1) should be fixed by incorporating 80.65(f)(4). Another commenter recommends that the Agency forego the refinery cap and rely instead on the downstream

cap for enforcement. One commenter states that in-line blending sampled methods at least should be sufficient prior to September 30, 2003, for early credit generation. After that date, these procedures should still be adequate, but EPA could require a correlation between the in-stream analyzers and an agreed-to inline cap to account for test method repeatability. **(American Petroleum Institute (IV-D-114), p. 138, Citgo Petroleum Corp. (IV-D-126), p. 3-4, Marathon Ashland Petroleum LLC (IV-D-81), p. 16, Mobil Oil Corp. (IV-D-113), p. 4-5, Phillips Petroleum Company (IV-D-82), p. A17, Sunoco, Inc. (IV-D-73), p. 20-21, Ultramar Diamond Shamrock Corp. (IV-D-75))**

**RESPONSE:** We agree that the in-line blending process is a unique situation and that the provisions of the RFG rule at 40 CFR § 80.65(f)(4) are adequate to assure that the refinery gate standards will not be compromised by allowing the gasoline sampling and testing to be completed as the batch leaves the refinery. Thus, the final rule adopts the provision of 40 CFR § 80.65(f)(4) for sulfur rule compliance for both CG and RFG. Relying on enforcement of the downstream cap as a substitute for refinery level compliance measures would not be effective for this rule, because enforcing only the downstream cap would not monitor compliance with refiner averaging, as well as other refinery level compliance flexibilities.

**COMMENT S:** Commenter points out error in Equation at 80.240(e)(2). **(Koch Petroleum Group, LP (IV-D-72), p. 33)**

**RESPONSE:** Section 80.240 has been changed in the final rule to correct the error in the equation.

**COMMENT T:** States generally that EPA should move to performance based test provisions rather than requiring specific test procedures. **(Koch Petroleum Group, LP (IV-D-72), p. 33, Marathon Ashland Petroleum LLC (IV-D-81), p. 17) (See other letter listed under Comment T.1 that follows.)**

**RESPONSE:** We are firmly committed, on an Agency-wide basis, to moving toward a performance-based approach (PBMS or Performance-Based Measurement System) to a wide variety of scientific measurement tasks. As explained in a Federal Register Notice on November 17, 1998 (63 FR 63789), the Agency intends to undertake a PBMS approach for the analytical measurement of the fuel parameters under its motor vehicle fuels programs. Pursuant to that end, the Office of Mobile Sources has been working for some time to develop a PBMS strategy. Such a strategy is necessarily quite complex if it is to provide sufficient protection of air quality, support a stable and predictable regulatory environment, and yet afford all parties the flexibility to develop and use a variety of innovative analytical measurement technologies. One feature of the approach to PBMS that is emerging is reliance upon a "designated test method" for each regulated parameter that will serve in three capacities: as a benchmark for the minimum level of precision that will be acceptable in alternative analytical test methods; as a "reference method" to which alternative analytical test methods must be adequately correlated in order to qualify; and as a primary tool in a program of statistical quality assurance that will be likely required of all analytical measurement methods. In today's rule, we are setting forth such a designated analytical test method for sulfur in the full expectation that it will be used the process of qualifying and controlling a variety of alternative analytical measurement methods and tools once the PBMS rule is finalized. Today's rule defers use of alternative analytical test methods until the PBMS rule is finalized. The following commenter provided detailed comment on this issue. That comment is summarized below.

**COMMENT T.1:** As one option, suggests acceptance of ASTM procedures, including updates upon ASTM approval (without further EPA rulemaking). **(National Petrochemical and Refiners Association (IV-D-118), p. 82)**

**RESPONSE:** The Agency has frequently selected ASTM-developed methods as its designated methods for demonstrating compliance under the fuels programs. But it has adopted a particular version of each such method, by publishing it (or incorporating it by reference) in the Federal Register. In each case the Agency was endorsing and adopting something that was completely known and available for examination, rather than the unknown result of some future ASTM action. We believe that to simply say that any ASTM-approved updated version of the originally designated method automatically becomes the designated method for purposes of compliance demonstrations would invite difficulties, since the newly published versions may change the method in such a way that the definition of what is being measured changes and no longer corresponds to what was used in setting the environmental standards that must be complied with. In addition, since qualification of alternative test methods under a PBMS approach would be tied to the precision of the designated method, changes to the designed method may affect the qualification of such alternative methods. The commenter suggests that the Agency could initiate a special rulemaking process if the Agency does not fully agree with a specific ASTM revision. We believe, however, that establishing special rulemakings as the only way for the Agency to disallow revisions to the regulatory method would create difficulties for both the Agency and the regulated industry. Such a process would place additional administrative burdens on the Agency and may create uncertainty for regulated parties, since parties could not be certain that a particular revision ultimately would not be disallowed. We believe that a provision which provides for the automatic adoption of the newest ASTM versions of designated regulatory test methods would also raise notice and comment concerns. The performance-based test methods rule currently under development gives a special status to methods approved by ASTM and other Voluntary Consensus-Based Standards Bodies (VCSBs), exempting them from the more rigorous evaluation to which lab-specific methods would be subjected.

**COMMENT U:** Attest deadline in 80.370(f) and 80.415 should be changed to May 31 to be consistent with other attest deadlines (80.75(m), 80.65(f)(2)(ii)(B), and 80.105(c)). **(Koch Petroleum Group, LP (IV-D-72), p. 34, National Petrochemical and Refiners Association (IV-D-118), p. 81)**

**RESPONSE:** We agree with the commenter and the final rule designates May 31 to be the attest deadline in §§ 80.370(f) and 80.415.

**COMMENT V:** Timing of downstream standards in 2005 and 2006 should be moved to March 1 to correspond to implementation of changes at the refinery by January 1. **(Sunoco, Inc. (IV-D-73), p. 31)**

**RESPONSE:** We agree that retailers need a lead-time period to meet new downstream standards, from the date that refiners are first required to meet a new refinery level standard. Under the final rule, refiners are required to meet new cap standards on January 1, 2004 and on January 1, 2006. We believe that for these years retail level parties should be able to comply with new downstream standards by March 1. To help facilitate this, the final rule also requires that terminals meet the standard by February 1. Our experience from other fuels programs indicates that retail level compliance can occur faster if there is an intermediate compliance date for terminals.



**COMMENT W:** There is no need to limit blendstocks that will be added to previously certified gasoline to the applicable per gallon cap standard. The blending facility will be considered a refiner under the regulations and thus will have to meet the applicable sulfur limits. Thus, there is no need to limit the sulfur content of the blendstocks used by the blending facility. **(Phillips Petroleum Company (IV-D-82), p. A19)**

**RESPONSE:** Refiners who produce gasoline by blending blendstock to previously certified gasoline (PCG) are not held to a more stringent standard than other refiners. Any such refiner may meet the same standards as other refiners. However, today's rule (section 80.340) also adopts the proposed alternative testing and compliance provisions for refiners who produce gasoline by blending blendstocks (including butane) to PCG. Refiners are free to elect either the every-batch testing provisions that apply to other refiners or the alternative provisions. The alternative provision for most blendstocks that will be added to PCG allows testing of the blendstock upon receipt, and use of that test result for the gasoline it produces, provided that the blendstock sulfur content does not exceed the per-gallon refinery level cap applicable to all refiners. This is a necessary requirement. Otherwise the refiner would be producing gasoline that exceeds the cap standard applicable to all refiners. To allow the blender to determine the sulfur content of the gasoline based on the sulfur content of the final product, including the PCG, would allow double counting of gasoline volumes and sulfur contents.

**COMMENT X:** EPA needs to clarify the provisions concerning California gasoline so that the segregation requirement applies to a downstream importer, not a refiner that produces reformulated gasoline for sale in a covered area outside of California. The preamble discussion implies that a downstream importer would not be able to import gasoline to California even if met all import specifications, segregations, and documentation requirements if the refiner did not meet the segregation requirements. EPA should clarify its position in the final rule. **(Phillips Petroleum Company (IV-D-82), p. A19-20)**

**RESPONSE:** These issues are addressed in detail in the preamble, section VI.

**COMMENT Y:** EPA should clarify that suppliers of test fuels under the R&D exemption are exempt from the rule's prohibitions and penalties provided the test fuel is supplied with the proper documentation and maintained by the supplier in a segregated manner until delivery. **(Phillips Petroleum Company (IV-D-82), p. A20-21)**

**RESPONSE:** This comment is addressed in section VI. of the preamble.

**COMMENT Z:** Section 80.320(b)(1) has a typographical error because the provision twice asks for the conventional gasoline baseline. **(American Petroleum Institute (IV-D-114), p. 152)**

**RESPONSE:** The comment is no longer relevant since the final rule changes the criteria for establishing a gasoline sulfur baseline for purposes of the ABT credit program. The ABT reporting requirements under § 80.320(b)(1) of the NPRM have been revised and moved to § 80.370 of the final rule.

**COMMENT AA:** The difference between truckers' and terminals' test results should be accepted if the difference is within the bounds of ASTM reproducibility, rather than the proposed 12 ppm variance which is inconsistent with the 15 ppm difference between the

refinery and downstream standards. **(American Petroleum Institute (IV-D-114), p. 152, Marathon Ashland Petroleum LLC (IV-D-81), p. 19)**

**RESPONSE:** Section 80.350, as modified in today's final rule, allows truck importers to use alternative compliance procedures because of the expense of every-batch testing of many small loads of gasoline imported by truck. The proposal included a quality assurance testing provision that required the trucker test results to be within ASTM reproducibility of the terminal's test results. The terminal's test results, under the proposal, would be required to be no greater than 30 ppm. Current ASTM reproducibility for ASTM D 2622 at 30 ppm is approximately 12 ppm. Therefore, the proposed rule provided that the difference in test results of the trucker and terminal had to be within 12 ppm. The commenter suggested that the correct reproducibility number should be 15 ppm to be consistent with the stated reproducibility number applicable to the ultimate 80 ppm refiner/importer level cap applicable in 2006 and beyond. The 15 ppm sulfur reproducibility number is the current ASTM reproducibility number for a sulfur concentration of 80 ppm, but it is not the reproducibility number for a sulfur concentration of 30 ppm. Note that the final rule has added an additional alternative for truck importers that allows truckers to use the alternative testing provision but participate in averaging. We have included in the rule a formula for calculating the reproducibility for any test result so that the trucker can carry out the requirement to determine if its test result is within ASTM reproducibility of the terminal's test result for any sulfur level. See Issue 21.(FF).

**COMMENT BB:** Regulations should allow records to be maintained in non-hardcopy formats, such as photographic or electronic means. **(American Petroleum Institute (IV-D-114), p. 152, Marathon Ashland Petroleum LLC (IV-D-81), p. 20)**

**RESPONSE:** We do not believe that the regulations as proposed preclude retaining the required records in electronic or photographic form. Parties that electronically generate and maintain records must make available to EPA the hardware and software necessary to review the records. As discussed in the Preamble to the sulfur final rule at Section VI.F.2., the final rule clarifies what test data records are required to be kept. Specifically, parties must keep the results of the test as originally printed by the testing apparatus, or where no printed result is generated by the testing apparatus, the results as originally recorded by the person who performed the tests. Where test data is initially recorded into a database system, and there are no prior written recordings of the data, the information in the database may serve as the original record of the test data.

**COMMENT CC:** Because of the specific nature of computer generated reports, EPA should specify all required reporting elements and not include the "such other information as EPA may require" language in section 80.370. **(American Petroleum Institute (IV-D-114), p. 152, Marathon Ashland Petroleum LLC (IV-D-81), p. 20)**

**RESPONSE:** The requirement to report "such other information as EPA may require" included in § 80.370 is also a requirement under the current RFG/CG regulations (See §§ 80.75 and 80.105). The purpose of this requirement is to allow the Agency to obtain additional information if, through experience with the program, the Agency determines that such information is necessary for monitoring compliance with the program requirements. The Agency would give parties subject to the reporting requirements adequate notice of any additional information that is required, and any additional information that is required would be specified on the report forms generated by the Agency. The Agency would require only such additional information that is reasonable and would not require the reporting of any information that is not specified on the reporting forms. Also, we can't

anticipate all information that might be needed in every situation, so we need to be able to request additional reasonable information beyond the minimum required.

**COMMENT DD:** Section 80.410(n) is too broad in not allowing any person to mix certified FRGAS and non-certified FRGAS; this language could apply to a consumer mixing the fuel in a vehicle gas tank. **(American Petroleum Institute (IV-D-114), p. 152, Marathon Ashland Petroleum LLC (IV-D-81), p. 20)**

**RESPONSE:** To clarify this point, today's final rule provides that the prohibitions against commingling of certified S-FRGAS with other gasolines apply until the gasoline is received by the importer and the importer has complied with the provisions of section 80.410(o).

**COMMENT EE:** Recommends that EPA adopt ASTM D 5453 as the test method for determining sulfur in biodiesel fuel rather than ASTM D 2622. Commenters provide an overview of the nature and environmental benefits of biodiesel and biodiesel blend fuels, including low sulfur levels. Commenters then discuss recent ASTM proceedings that evaluated both of the applicable test methods for sulfur. These evaluations documented a significantly high bias in using ASTM D 2622 for these types of fuel and the recommendation has been made to use ASTM D 5453 in future versions of the ASTM biodiesel standard. In addition, it appears that ASTM D 5453 is more cost-effective than ASTM D 2622. At the least, the commenters suggest that ASTM D 5453 be an approved alternative means of sulfur testing for biodiesel fuels. **(Howell, S. (IV-D-243), National Biodiesel Board (IV-D-244))**

**RESPONSE:** This comment addresses an issue not pertaining to the gasoline sulfur rule but rather the recent Advanced Notice of Proposed Rulemaking pertaining to diesel fuel standards, and will be considered in that rulemaking.

**COMMENTS FF:** EPA should alter the final gasoline sulfur rule to permit truck importers to comply with the sulfur standards using an averaged standard with per-gallon caps. In addition, the downstream sulfur cap standards outlined in proposed section 80.210 should be applied to conventional gasoline that is imported by truck. **(Bjornson Oil Company, et. al. (IV-D-155), p. 4-5)**

**RESPONSE:** We agree that it is appropriate to allow truck importers who utilize the proposed alternative testing and compliance procedures to comply with the national average standard and cap standard applicable to other importers. The final rule adopts this second alternative provision, but also retains the proposed alternative because some truckers may still find the proposed alternative to be useful, since it requires less reporting. Canada has issued a gasoline sulfur rule which requires Canadian gasoline to meet a 30 ppm average and an 80 ppm cap by 2005 (and a 150 ppm average and a 300 ppm cap in 2004). Therefore, gasoline at Canadian terminals should average about 30 ppm, but will sometimes have a sulfur content greater than 30 ppm. Gasoline at Canadian terminals should not exceed 80 ppm in 2005 and beyond. It should be possible for truck importers of Canadian gasoline to meet an average standard of 30 ppm and a cap of 80 ppm. On the other hand, it might be difficult for such truckers to meet the proposed 30 ppm per-gallon cap standard for the same reasons. We disagree that downstream standards should apply to any importers. That would not be an environmentally neutral alternative approach.

**COMMENT GG:** The proposed compliance provisions are appropriate for foreign refiners

and other foreign parties because GATT allows EPA to adopt special measures to secure compliance by foreign parties. However, a major weakness in the proposed enforcement provisions is the lack of effective criminal sanctions against foreign individuals responsible for violations. Such sanctions are particularly important because the sulfur program relies extensively on written certifications and verifications. Agents or employees who execute false documents for domestic refiners face personal criminal liability. Foreign signatories should face comparable liability. Effective extradition arrangements or alternative jurisdictional undertakings should be in place before a foreign refiner is allowed to export gasoline to the U.S. in compliance with the sulfur rule or its small refiner exception. **(Independent Refiners Coalition (IV-D-120), p. 6-8, Sunoco, Inc. (IV-D-73), p. 15-16, Tosco Corp. (IV-D-111), p. 5)**

**RESPONSE:** We agree that it is imperative that the sulfur rule's enforcement provisions for foreign refiners, as for domestic refiners, be effective, and we believe the provisions of the rule are sufficient and that attempts to further strengthen them would not significantly increase their overall effectiveness. The final rule imposes various requirements on foreign refiners not required of domestic refiners, including the requirement to post bonds. Similar provisions have been implemented under the RFG/CG program and we believe those provisions have been effective.

A foreign refiner with an individual refinery baseline who submits false documents to EPA or who fails to meet other requirements will be subject to civil, and in certain cases, criminal enforcement. The sanctions for civil and criminal violations committed by foreign refiners with individual refinery baselines or employees of such foreign refiners include the sanctions specified in the Clean Air Act. Under CAA section 211(d), the penalty for civil violations of the sulfur rule is up to \$25,000<sup>4</sup> per day of violation plus the amount of economic benefit or savings resulting from the violation. Injunctive authority is also included under CAA section CAA 211(d). CAA section 113(c) specifies that the criminal penalty for first violations of knowingly making false statements or reports is a fine pursuant to title 18 of the U.S. Code, or imprisonment for up to 5 years. The period of maximum imprisonment and the maximum fine are doubled for repeat convictions. As indicated above, the provisions for foreign refiners with individual refinery baselines under the sulfur rule are similar to the provisions for foreign refiners with individual baselines under the RFG/CG program, including sanctions for civil and criminal violations. For further discussion of these sanctions, see 62 FR 45540-41 (August 28, 1997).

**COMMENT HH:** EPA should remove the foreign terminal inspection access provisions from proposed section 80.350. The importers will remain liable and can address penalty concerns through contractual provisions with their suppliers. **(Bjornson Oil Company, et al. (IV-D-155), p. 5-6, Independent Fuel Terminal Operator Association, (IV-D-158), p. 12-13)**

**RESPONSE:** We disagree with the commenter. The importer will not necessarily remain liable for standard violations if evidence of violations can be effectively concealed from EPA. Therefore, EPA believes that for the alternative truck importer provisions to be enforceable, it is necessary that EPA be able to inspect the foreign terminal that supplies the truck importer and that conducts testing that the truck importer relies on. This is no more a requirement than those the rule imposes on gasoline imported by other parties, both foreign and domestic. We are therefore adopting the proposed approach requiring that the trucker ensure that EPA be allowed to inspect the foreign terminals where a truck

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<sup>4</sup> Pursuant to the Debt Collection Improvement Act of 1996 (31 U.S.C. 3701 note), the maximum penalty amount prescribed in section 211(d)(1) of the CAA was increased to \$27,500. (See 40 CFR Part 19).

importer elects to use either alternative compliance approach.

**COMMENT II:** Enforcement should be phased in to allow the distribution system sufficient time for turn over. CA provided a 45-day window for terminals after beginning enforcement at the producer level, and then another 45-day period for turn over of storage tanks, before enforcing further downstream. **(California Air Resources (IV-D-271), p. 5)**

**RESPONSE:** We agree that a transition period is required, subsequent to the date refiners and importers are required to meet a new sulfur standard, to allow downstream parties to turn over their product and comply with the new standard. The final rule provides that when the new national refinery caps go into effect on January 1, 2004 and January 1, 2006, terminals will have 1 month lead-time to comply, i.e., until February 1. Retailers have one month from the date that terminals must comply, i.e., until March 1. See Issue 21.V, above.

## ISSUE 22: OTHER GASOLINE SULFUR COMMENTS

**COMMENT A:** The absence of a low sulfur standard in the U.S. would threaten the viability of some domestic refineries due to the potential for increased imports and decreased exports (since many other countries now require low sulfur fuels). (**Alliance of Automobile Manufacturers (IV-D-115), p. 126**)

**RESPONSE:** The commenter believes that, as Europe, Japan, southeast Asia and Canada move toward low sulfur fuel requirements, the absence of a strong sulfur regulation in the U.S. would result in increased imports to the U.S., since foreign refiners would be unable to sell higher sulfur fuel in their own countries. Exports of higher sulfur gasoline from the U.S. would also decrease as the foreign markets for higher sulfur fuel shrink. The commenter believes this would have an adverse affect on domestic refiners. The commenter recommends more stringent sulfur standards than those proposed. While we agree that a failure to implement a low sulfur standard in the U.S. could result a market disadvantage to domestic refiners in the future, we also believe that the final rule provides gasoline sulfur standards that generally are as stringent as, or more stringent than, current and anticipated sulfur standards in other countries. As a result, domestic refiners will have the capability to produce low sulfur gasoline for the international market as well as the domestic market, and imports to the U.S. should not substantially increase.

**COMMENT B:** A significant portion of the gasoline consumed is imported from foreign refiners, which should be subject to the same standards and requirements as domestic refiners. To do otherwise would harm the ability of domestic refiners to compete in the marketplace. (**National Petrochemical and Refiners Association (IV-D-118), p. 2, Sunoco, Inc. (Philadelphia - Day 1) (IV-F-131)) (See other letters listed under Comments B.1 through B.4 that follow.)**

**RESPONSE:** Several commenters expressed the concern that, while domestic refiners will be forced to make the refinery investments necessary for their entire gasoline refining capacity to produce low sulfur product, foreign refiners will be able to direct existing lower sulfur streams to the U.S. and send higher sulfur product to other markets. These commenters believe that allowing foreign refiners the opportunity to escape the investment required for refinery desulfurization technology will create a competitive disadvantage for domestic refiners. We acknowledge that some foreign refiners may have additional flexibility as indicated by the commenters. However, we believe that it will be necessary for many foreign refiners to install gasoline desulfurization equipment to comply with the low sulfur gasoline requirements that have been proposed and/or finalized in other countries (e.g., Europe, Canada, Japan). As a result, foreign refiners will not avoid all desulfurization-related costs. While it is true that only gasoline imported into the U.S. from foreign refiners is subject to the sulfur rule, we note that the sulfur provisions similarly do not apply to gasoline exported from the U.S. by domestic refiners to other countries. Only gasoline produced for use in the U.S., either by domestic or foreign refiners, is subject to the sulfur standards and requirements. Under the final rule, baselines for generating ABT credits will be based only on gasoline produced for use in the U.S. or imported by foreign refiners into the U.S. Similarly, small domestic refinery baselines will be based only on gasoline produced for use in the U.S. Small foreign refinery baselines will be based only on gasoline imported into the U.S. One commenter believes that foreign refiner baselines and sulfur reductions should be based on total refinery production, rather than only gasoline imported into the U.S. EPA's sulfur program, however, is not aimed at regulating the quality of gasoline used in other countries, nor at regulating foreign refiners except with regard to the gasoline they send to the U.S. One commenter expressed concern because the NPRM specifies that EPA will assign to a small foreign refinery that was not operating in 1997-98 a baseline volume limit equal to its capability, which the commenter says would be a gross overstatement of imports into the

U.S. Under the final rule, for small refiners who acquire a refinery after January 1, 1999, or reactivate a refinery that was not in operation in 1997-1998, EPA will determine the sulfur baseline and baseline volume based on all available information. Where appropriate, EPA will look at the most recent year of operation. The baseline volume for foreign refiners will be based only on information regarding the volume of gasoline imported into the U.S. The commenter also said that EPA should require submission of information about the sulfur test method and sampling procedures used by small foreign refineries for the purpose of establishing a 1997-98 sulfur baseline, since domestic refiners were required to use ASTM D-2622-92 during those years. Under the final rule, any foreign refiner who wishes to generate early credits and who does not have an approved baseline under § 80.94 (for purposes of complying with the anti-dumping regulations), must establish a sulfur baseline in accordance with the requirements under the anti-dumping regulations. These regulations require use of the regulatory test method and allow another method only if the procedures are, or were at the time of measurement, industry-accepted procedures for measuring the applicable property.

**COMMENT B.1:** EPA should ensure that foreign refiners of substantial size not take advantage of the proposed special treatment for small refiners. **(American Petroleum Institute (IV-D-114), p. 133-134, Koch Petroleum Group, LP (IV-D-72), p. 38, Tosco Refining Company (IV-F-56))**

**RESPONSE:** The final rule allows foreign and domestic refiners to apply for an individual refinery baseline under the small refiner provisions. In the NPRM, we defined "small refiner" to be one that has 1500 employees or less throughout the corporation as of January 1, 1999. Several commenters said that the final rule should include a capacity limit in the definition of small refiner. One commenter believes that, because petroleum refining is not labor intensive, it is possible that foreign refineries with up to 500,000 bpcd capacity could qualify as "small." Another commenter said that refiners who would not otherwise qualify could restructure or create new corporate entities in order to meet the small refiner criterion.

As discussed in preamble, we have decided to include in the final rule a capacity limit to the definition of small refiner. Under the final rule, to qualify as a small refiner, a refiner must have a corporate average capacity of no more than 155,000 bpcd in addition to fulfilling the employee size requirement. The final rule also provides that the corporate size determination will be based on the average number of employees during the 12 months preceding January 1, 1999. As a result, a foreign refiner must demonstrate that its company's corporate structure as it existed during the 12 months preceding January 1, 1999, meets the employee size criteria. In the case of a government-owned foreign refinery, the "corporation" would include all employees of the government for purposes of satisfying the small refiner employee size requirement. We believe that the volume and size requirements of the final rule will ensure that only those foreign refiners who may well face more difficulty in meeting the low sulfur standards and are, in fact, small volume gasoline producers are granted a small refinery exemption, and that refiners will not be able to restructure or create new corporate entities for the purpose of meeting the small refiner definition.

**COMMENT B.2:** EPA should either prohibit foreign imports from refiners that do not comply with all U.S. environmental regulations or should place an additional fee to affect environmental costs on imported gasoline and blending stocks. **(Valero Energy Corporation (IV-F-78))**

**RESPONSE:** See general response to Issue 22.B, above. Although the corporate average standards and the refinery standards do not apply directly to the foreign refiners, importers of gasoline are subject to the corporate average standards and refinery standards for all of their imported gasoline during the compliance period. Foreign refiners, therefore, are indirectly subject to these standards for the gasoline they produce for use in the U.S. through their importer. Since foreign gasoline imported into the U.S. must meet the sulfur standards, just like gasoline produced domestically, there is no need for additional fees for imported gasoline.

**COMMENT B.3:** Commenter notes that the foreign refiner regulatory provisions are generally too complex. EPA should make the necessary changes to 80.94 rather than creating a whole new section with only minor word changes in 80.410. **(Koch Petroleum Group, LP (IV-D-72), p. 38)**

**RESPONSE:** We have considered this comment, however, we believe there are substantive differences between the requirements for foreign refiners under § 80.94 and the requirements for foreign refiners under the sulfur rule which make it difficult to adapt the provisions at § 80.94 to include the requirements of the sulfur rule. We believe the result would be a cumbersome set of regulatory provisions at § 80.94 which ultimately may create unnecessary confusion for regulated parties. As a result, the final rule retains the proposed foreign refiner provisions of § 80.410, with the modifications to the provisions as noted in Preamble section VI.

**COMMENT B.4:** Foreign refiners will have to meet the corporate average only for gasoline imports, not their entire production. This would limit foreign refiners' obligations and create a competitive disadvantage for U.S. refiners. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 19)**

**RESPONSE:** See general response to Issue 22.B and response to Issue 22.B.2, above.

**COMMENTS C, D AND Q:** EPA must clarify that it "directly" controls sulfur under Section 211(c) for both conventional and reformulated gasoline, thus preempting state regulation of sulfur. Some commenters only noted generally that EPA needs to take a strong federal preemption stance, while another commenter urged EPA to disapprove any state proposals that would require gasoline sulfur controls that are different in magnitude or timing than the federal controls. Some of these commenters add that it is appropriate for EPA actively to advise states to refrain from adopting special low-sulfur fuel programs. For states that continue with their own fuel programs, the Agency should require a substantive showing that all requirements under section 211(c)(4)(C) of the CAA are met. However, another commenter argues that Federal environmental laws and regulations should not preempt state law and programs, except as necessary to achieve the minimum national standards. States should retain the ability to adopt state-specific fuel standards designed to achieve the NAAQS. **(American Petroleum Institute (IV-D-114), p. 83-84, Ergon, Inc. (IV-D-157), p. 10-12, Exxon Company, USA (IV-D-119), p. 1, Independent Fuel Terminal Operators Association (IV-D-158), p. 11-12, Mobil Oil Corp. (IV-D-113), p. 5, National Conference of State Legislatures (IV-D-214), Phillips Petroleum Company (IV-D-82), p. 2, A4-5, Society of Independent Gasoline Marketers of America (IV-D-156), p. 10)**

**RESPONSE:** As we state in the preamble, these regulations clearly preempt future state actions to prescribe or enforce fuel sulfur controls. Consequently, states with fuel sulfur control programs not already approved into their SIPs will need to obtain a waiver from us under the provisions described in section 211(c)(4)(C) for all state fuel sulfur control measures, unless the state standard is identical to our sulfur standard. We have communicated this position in the past and will continue to share this position with states in the future.

**COMMENT E:** EPA should harmonize federal fuels with California standards before finalizing the Tier 2 rule. **(Alliance of Automobile Manufacturers (IV-D-115), p. 110, 120)**

**RESPONSE:** While there are substantial similarities between the Tier 2 standards and the California LEV-II standards, there are some differences that make it possible to have different fuel standards applicable to the federal program while enabling manufacturers to comply with the Tier 2 standards. Furthermore, the strict California gasoline requirements not only enable their



emission control standards but also exact additional emissions reductions from the existing fleet. These reductions come at a cost that is higher than the costs of our gasoline sulfur program. The severe air quality problems in California make these higher costs appropriate. We believe our program to control gasoline sulfur is a more cost-effective alternative than the California gasoline standards at a national level, and will reduce sulfur to levels needed to enable Tier 2 vehicle technology.

**COMMENT F:** EPA/Congress should consider a system of tax credits and subsidies on a per refinery basis, which would allow universal compliance in a shorter time frame. Suggests that Congress build on the success of the Title IV provision that allowed small refiners to earn SO<sub>2</sub> allowances, and extend that type of incentive to all refiners that are investing in desulfurization technology. **(Bell, S. (IV-F-89), Sinclair Oil Corp. (IV-D-150), Ex. 2, p. 9)**

**RESPONSE:** We do not have the authority to implement tax credits or subsidies. Congress has taken no action on this recommendation to date. We believe our final gasoline sulfur program will allow the refining industry to comply with the standards in the proscribed time frame, due to the various flexibilities and alternatives we have provided.

**COMMENT G:** EPA may need to address the issue of sulfur in lube oil. Automakers are actively pursuing ways to reduce sulfur lube oil, which allows the sulfur to reach the catalyst as a result in engine oil consumption. For example, certain anti-wear additives containing sulfur may be replaced with others that do not. However, the impact of sulfur lube oil will only occur gradually and should not affect emissions in the early years of the program. Still, this sulfur may need to be evaluated by EPA, particularly in the context of durability testing. Oil industry commenters note that a near zero sulfur fuel appears especially unnecessary given that lube oil appears to contribute sulfur roughly equivalent to 4 ppm in gasoline. Thus the commercial viability of technologies that are highly sensitive to sulfur is questionable. **(Alliance of Automobile Manufacturers (IV-D-115), p. 120-121, American Petroleum Institute (IV-D-114), p. 153, Mobil Oil Corp. (IV-D-113), p. 12)**

**RESPONSE:** We have no data at this time which suggests that we need to regulate lube oil quality, particularly in the context of the ability of automakers to comply with the Tier 2 standards. If such data become available in the future, we will consider whether action is necessary. In the meantime, we believe the existing efforts for coordination between automakers and lube oil producers provides the best means to resolve these types of concerns.

**COMMENTS H AND O:** The proposed rule neglects to consider the impact of combustion chamber deposits (CCD) on emissions. Auto industry commenters suggest that EPA should adopt California's standard and test procedure to control and measure CCDs. The integrity of the combustion chamber is an important element of combustion efficiency. CCD deposits also affect chamber integrity and, therefore, increase emission rates. CCDs affect NO<sub>x</sub> emissions by increasing the combustion temperature, which increases engine-out NO<sub>x</sub> levels. California has long recognized the value of keeping combustion chambers clean and has adopted a test procedure to measure CCD. California requires refiners to use an additive designed to reduce CCD and there are at least two suppliers that claim their additives will eliminate CCD completely. Section 211(l) of the CAA addresses this issue by requiring EPA to specify the qualities of detergent additives that will prevent deposits from accumulating in engines and fuel supply systems. EPA should implement measures to control combustion chamber deposits, which would help improve the consistency between Federal and California fuel standards. However, refinery commenters oppose Alliance proposal to regulate CCD further because latest CRC CCD studies indicate current requirements are sufficient. **(Alliance of Automobile Manufacturers**

**(IV-D-115), p. 133, American Petroleum Institute (IV-D-114), p. 151, Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), Marathon Ashland Petroleum LLC (IV-D-81), p. 70)**

**RESPONSE:** This comment is beyond the scope of the proposed rule. However, we will give a brief response here. When we finalized our gasoline deposit control additive ("detergents") regulations in 1996 [See 61 FR 35309], we stated that we did not have sufficient information to warrant control of combustion chamber deposits (CCD). We indicated we would continue to monitor this issue, including ongoing industry test programs, and would reevaluate our position as more data becomes available. We have not yet determined that control of CCD is necessary. Furthermore, none of the data submitted to us since proposal of the Tier 2 standards suggests that CCD control is required for compliance with these standards. Hence, we are not proposing to take any action on CCD at this time.

**COMMENT I:** EPA should regulate aromatic hydrocarbons (which contribute to the formation of PM emissions and engine deposits), and other contaminants and fuel additives, such as Silicon and MMT, that adversely affect emission control systems. **(General Motors Corporation (IV-D-209), vol. 3, p. 14)**

**RESPONSE:** This comment is beyond the scope of the proposed rule. However, we will give a brief response here. We will continue to use our authority under Clean Air Act § 211(c) as appropriate to regulate fuels and fuel additives that have deleterious effects on emission control systems or result in emission products that are harmful to public health. At this time, we have no plans to undertake rulemaking with respect to any of the fuel additives mentioned. However, we continue to study these issues and will take action as appropriate.

**COMMENT J:** Supports EPA's proposal to require aviation and racing fuels to meet the same sulfur standards as automotive gasoline only if refiners or distributors fail to keep these fuels segregated from and unavailable for use in motor vehicles. If these fuels are made available for motor vehicle use by a distributor, then EPA should apply only the downstream standard to the gasoline. The distributor who occasionally needs to downgrade these specialty fuels will not be registered as a refinery or have the ability to cope with the refinery administrative processes. As long as the downstream standard is met, there is no overriding environmental impact of this type of occasional downgrading. **(Alliance of Automobile Manufacturers (IV-D-115), p. 145, Phillips Petroleum Company (IV-D-82), p. A15)**

**RESPONSE:** We disagree with the suggestion that if aviation gas or racing gasoline are converted to use as a motor vehicle fuel by a downstream party, that party should only have to meet the downstream cap standard. If such fuel were only required to meet the downstream cap the refinery gate average and cap standards would be circumvented. Such a loophole could give downstream parties an incentive to blend higher sulfur blendstocks to cleaner downstream fuel, effectively negating the average standard. Thus, an adverse environmental impact is possible. Under today's rule, any party who adds any blendstock to previously certified gasoline or who introduces any product for use as gasoline in motor vehicles, is a refiner, subject to all refiner standards and recordkeeping, reporting and testing requirements.

**COMMENT K:** EPA should ensure that exempted high sulfur test fuels are not used on vehicles that are later returned to the general fleet. **(Alliance of Automobile Manufacturers (IV-D-115), p. 146)**

**RESPONSE:** As discussed in Preamble section VI.G., EPA agrees that it would be improper to

permit vehicles that have been used in an R&D program to be used in the general fleet if their emission controls have been rendered inoperative through fueling with high sulfur gasoline. However, we believe that this issue is already effectively addressed through the anti-tampering requirements of section 203(a)(3)(A) of the Clean Air Act, 42 USC 7522(a)(3)(A), as well as in the language of the final sulfur rule providing the Administrator with the power to include appropriate conditions on the granting of an R&D exemption.

The commenter also said that others besides refiners may want to conduct research using high sulfur fuels. We note that the sulfur rule as proposed (and as finalized) provides that "any person" may request an exemption for gasoline used for R&D purposes.

**COMMENT L:** EPA should fully consider all of the fuel quality issues raised in this proposal, as well as other regulatory or legislative actions that could impact fuels, when assessing the overall impact on the industry. These other regulations may include: State Implementation Plan requirements for nonattainment areas; other state programs; future low sulfur diesel regulation; Refinery MACT II and other air toxic issues; state hazardous and solid waste requirements; and potential MTBE phase-out. EPA should allow for unique Alaska issues to be considered as under the diesel requirements. **(American Petroleum Institute (IV-D-114), p. 6, National Petrochemical and Refiners Association (IV-D-118), p. 24-25, Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Thomas Questions, p. 2, Williams Companies, Inc. (IV-D-53), p. 2)**

**RESPONSE:** To the extent that federal actions have been proposed or finalized for any of these other regulations, we have taken them into consideration as part of our evaluation of the implications of gasoline sulfur control for the refining industry. In a similar manner, as we consider other fuel actions in the future, such as diesel fuel sulfur control, we will do so in light of our gasoline sulfur requirements. The reader is also referred to our responses to Issue 20.1, comments H.3 and K, for additional thoughts on the other regulations which refineries may face and which may be impacted by the gasoline sulfur requirements. See also our responses to Issue 13.F and Issue 16.H.2 for our thoughts on the Alaska issues raised, and our responses to Issue 31 for our thoughts on the MTBE issue.

**COMMENT M:** EPA should evaluate and disclose any energy security implications from the gasoline sulfur proposal. **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Bennet Questions, p. 1)**

**RESPONSE:** We are not aware of any energy security implications resulting from this rule. We believe we have designed a program that refiners can meet without supply shortages or significant price increases. We coordinated our efforts with the Department of Energy, and believe our final program addresses any concerns they had on this subject. See our response to Issue 23.2.2 for more discussion of this issue.

**COMMENT N:** EPA has not met the statutory test in section 211(c)(1). Section 211(c)(1)(B) requires that the EPA find "emission products of such fuel or fuel additive will impair to a significant degree the performance of any emission control device or system which is in general use, or which the Administrator finds has been developed to a point where in a reasonable time it would be in use were such regulation to be promulgated." Commenter notes that the emission control devices under discussion in the notice of proposed rulemaking are not in general use and strongly disagrees that EPA has demonstrated that they are likely to be in general use, given issues related to air toxics and EPA's legal basis for establishing new ambient air quality standards. The information supporting the rule does not include conclusive findings that sulfur in

gasoline endangers public health or welfare as required under section 211(c)(1)(A). **(Williams Companies, Inc. (IV-D-53), p. 4-5)**

**RESPONSE:** Our technical justification for why we believe that Tier 2 emission control systems will be adversely impacted by gasoline sulfur (and thus why gasoline sulfur must be controlled) is presented in the Regulatory Impact Analysis, with a brief summary in the preamble. See also our responses to Issue 26, many of which explain why sulfur control is needed for Tier 2 vehicles.

In addition, we disagree with the commenter that the emissions control technology adversely affected by sulfur in gasoline is not, and cannot in the future be reasonably expected to be, available. Vehicles meeting the Tier 1 and LEV standards, which are on the road today, demonstrate significant sensitivity to sulfur at the levels currently present in gasoline. In addition, the emissions control technology that we expect will be used in Tier 2 vehicles is also expected to be sensitive to sulfur, with test data supporting a conclusion that the sulfur effects are irreversible to a significant degree. Our analysis of the emissions control technologies expected to be used by automakers to meet the Tier 2 standards is described in the preamble and responses to comments in Issues 19 and 26.1. A more detailed analysis of the effects of sulfur on these technologies can be found in Appendix B of the RIA for this action. One commenter also stated that we have not made the requisite finding under Section 211(c)(2)(A) necessary to regulate sulfur. We disagree. Our analysis under Section 211(c) is described in more detail in Appendix D of the RIA.

**COMMENT P:** Sulfur is the only parameter that should be regulated. **(Cenex Harvest States (IV-D-131), p. 1-2)**

**RESPONSE:** Based on data available at this time, we have concluded that sulfur is the only parameter that needs to be controlled to enable vehicles to meet the Tier 2 standards. We will continue to evaluate whether other fuel properties or fuel additives need to be controlled to protect emission control systems in general or provide adequate protection of public health.

**COMMENT R:** EPA should require a 50 ppmv SO<sub>x</sub> standard under the Refinery MACT II standard for FCC vents to take advantage of the synergy between the fuel sulfur regulations and the NSPS/MACT refinery regulations. **(Rao, P. (IV-D-103))**

**RESPONSE:** This comment is beyond the scope of the proposed rule. However, we will give a brief response here. While we understand that SO<sub>x</sub> emissions are of concern, EPA cannot designate HAP standards under section 112 for the control of criteria or ambient pollutants regulated elsewhere under the Clean Air Act. Criteria pollutants are subject to the requirements of section 111 of the Act (i.e., new source performance standards). Therefore, the Refinery MACT II standard will not include SO<sub>x</sub> control requirements.

**COMMENT S:** EPA should require sulfur labeling at the pump. Attaches paper on the benefits of sulfur labeling. **(Rao, P. (IV-D-103))**

**RESPONSE:** While we acknowledge the commenter's point that it could ultimately be beneficial to the environment for consumers to know the sulfur content of the gasoline at the pump, the gasoline sulfur rule does not focus on market forces as a means of achieving the environmental goals of the program. Rather, the rule prescribes regulations which set specific controls or prohibitions to achieve these goals. The Agency believes that the controls prescribed in the sulfur rule are sufficient to ensure that the environmental goals of the program are met. However, as discussed in Preamble section VI.C., we believe that some retailers, for marketing

purposes, may choose to label gasoline pumps or post signs stating that the product is low sulfur gasoline. We are concerned that if retailers make such claims that they do so truthfully and accurately. As a result, it is EPA's policy that any gasoline represented to be low sulfur gasoline should have a sulfur content no higher than 95 ppm. The reader is directed to Preamble VI.C. for further discussion of this policy.

**COMMENT T:** EPA should require monitoring and weekly reporting of sulfur in fuel sold. **(Rao, P. (IV-D-103))**

**RESPONSE:** The sulfur rule is based on a "refinery gate" concept in which the average and per-gallon cap sulfur standards are met by the refiner or importer of the gasoline. Under this approach, downstream standards, which apply to all parties in the distribution system downstream of the refiner or importer, are included in the regulations as enforcement tools to ensure that the quality of the gasoline is not altered in the gasoline distribution system before it is used by consumers. As a result, compliance with the average and per-gallon cap standards is reported by refiners and importers and not by downstream parties. We do not believe that weekly reporting is necessary under the sulfur program. We do not require weekly reporting under other fuels programs, which we believe are being effectively enforced. As a result, we believe that to require weekly reporting would impose an unnecessary regulatory burden on industry. However, the Agency also will be conducting downstream enforcement by sampling and testing gasoline for sulfur content at all points in the gasoline distribution system. A similar enforcement scheme exists under the RFG rule. We have found this to be an effective approach for monitoring compliance of both the overall gasoline pool and individual downstream facilities. We believe that problems in specific areas will be identified through this approach.

**COMMENT U:** Gasoline exported from the U.S. should have to meet the final low-sulfur standard. **(International Center for Technology Assessment (IV-D-122), p. 9)**

**RESPONSE:** See response to Comment 22.B. EPA's sulfur program is not aimed at regulating the quality of gasoline used in other countries, just as it is not aimed at regulating foreign refiners except with regard to the gasoline they send to the U.S. While exported gasoline may be subject to sulfur requirements adopted by other countries where the gasoline is sold, it is the sulfur reductions in gasoline sold in the U.S. that are necessary to achieve the goals of our program.

**COMMENT V:** EPA should delete proposed section 80.215 because oxygenate blenders that are not registered as refiners could not increase sulfur levels solely through adding oxygenates. If the section is retained, EPA must clarify what responsibilities a blender has under the sulfur control program separate from existing responsibilities under RFG/anti-dumping. **(Society of Independent Gasoline Marketers of America (IV-D-156), p. 10)**

**RESPONSE:** We agree with the commenter that the sulfur rule should be clarified with regard to the requirements for downstream oxygenate blenders. As a result, § 80.215 has been revised in the final rule to clarify that oxygenate blenders are not subject to the requirements for refiners under the sulfur rule, but are subject to the requirements and prohibitions applicable to other downstream parties. In addition, the final rule adds a provision to § 80.385 which prohibits any person from blending into gasoline denatured ethanol with a sulfur content higher than 30 ppm. The final rule also revises the liability provisions of § 80.395 to include oxygenate blenders in the parties liable for violations of the prohibitions at § 80.385(b), (c), (d) and (e), and parties liable for a failure to meet a requirement (such as a PTD requirement) of Subpart H, or cause another person to fail to meet a requirement.

**COMMENT W:** The rule should be revised to clarify that blenders are deemed to be refiners for all purposes other than the small refiner provisions. **(Sutherland, Asbill, & Brennan, LLP (IV-D-225))**

**RESPONSE:** Section 80.2(i) defines a refiner as any person who owns, leases, operates, controls, or supervises a refinery. Under proposed § 80.2(h), a refinery is defined as "any facility, including but not limited to, a plant, tanker truck, or vessel where gasoline or diesel fuel is produced, including any facility at which blendstocks are combined to produce gasoline or diesel fuel, or at which blendstock is added to gasoline or diesel fuel." We believe that this language clearly indicates that gasoline blenders are considered refiners under the fuels regulations at 40 CFR Part 80. As a result, gasoline blenders are responsible for fulfilling all of the requirements for refiners under the sulfur rule. The final rule also includes language which clarifies that gasoline blenders are not eligible for the small refiner provisions, and language which excludes gasoline blenders from generating early credits. These clarifications are appropriate since the small refiner provisions are intended to provide more time to install desulfurization equipment to those refiners who face unique economic hardships that warrant additional time, and blenders, although they are considered refiners, will not need to make such investments. The early credit provisions are similarly intended to provide incentives for refiners who need to install desulfurization equipment to do so early, if possible, and thus are made available to refiners who EPA believes will need to make such investments.

**COMMENT X:** EPA should conduct a thorough analysis of the cost impacts of interfacing 30 ppm and 3,000 ppm fuel. When high sulfur diesel (3,000 ppm average) is moved in conjunction with very low sulfur (30 ppm average) gasoline, the interface, which would have normally been gradually blended back into gasoline, can no longer be blended into either the gasoline or diesel batch and meet the quality requirements. EPA needs to evaluate the costs associated with these distribution impacts. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 40)**

**RESPONSE:** We are aware that when gasoline is transported through pipelines, there will be some situations where adjacent distillate product in the pipeline will mix with a portion of the gasoline to create an interface product, commonly referred to as transmix. This transmix may not be blended into the diesel fuel because the gasoline in the transmix may result in diesel fuel performance problems. Historically, this type of transmix product has either been blended into the gasoline, in limited concentrations, or the transmix has been separated into its gasoline and distillate components at a reprocessing plant. However, the practice of blending the transmix into gasoline may result in violations of the downstream standards for RFG. Furthermore, such blending could violate the downstream sulfur caps finalized in today's rule, because many distillates have a very high sulfur content. Therefore, we believe regulatory provisions are needed to resolve these issues. We have not addressed transmix issues in today's rule because we have already proposed regulations regarding transmix blending and processing in another rulemaking. See 62 FR 37337 et seq. (July 11, 1997). We plan to address issues regarding compliance with today's rule in that rulemaking. For that rulemaking, we will consider all aspects regarding transmix compliance with the sulfur rule, including the associated costs.

## **ISSUE 23: PROGRAM COST PROJECTIONS**

### **Issue 23.1: Vehicle Costs**

#### **Issue 23.1.1: Accuracy of Vehicle Cost Analysis**

**COMMENT A:** It is difficult to estimate the potential cost increases of the Tier 2 rule. There is too much uncertainty associated with the interaction between sulfur and the new technology that will be employed by manufacturers to meet the standards. **(American Honda Motor Co. (IV-F-48)) (See other letter listed under Comment A.1 that follows.)**

**RESPONSE:** We are finalizing provisions in this rule that will lead to substantial reductions in gasoline sulfur. The technologies that will be used in our Tier 2 program are known. We believe that these technologies will be feasible and durable given the levels of sulfur that will be present in the available fuel. We believe that we have followed appropriate procedures to cost out those technologies.

**COMMENT A.1:** The precious metal market is very volatile and prices are very uncertain. For example, palladium prices have doubled and rhodium prices have tripled in the last two years. Future supply and demand is even more uncertain. More stringent emission standards are being adopted worldwide, which will increase the need for precious metal use in catalysts. Offsetting this to an unknown degree are advancements in catalyst design, which will make more efficient use of catalytic material. There is no way to know at this time which trend will dominate. Future demand is very important because the supply of palladium and rhodium is not expected to increase substantially. **(Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 2-3)**

**RESPONSE:** We note that the commenter's concerns exist whether the Tier 2 standards are implemented or not. The precious metals price increases cited by the commenter have already occurred and were factored into our cost analysis. Nevertheless, we are concerned about possible future external factors that could impact the cost of our rule.

EPA and its contractor conducted extensive discussions with catalyst manufacturers, who generally stated their belief that compliance with Tier 2 standards will be achieved without substantial increases in catalyst loading. Catalyst manufacturers cite the considerable improvements in catalyst design that have been occurring in recent years and that are expected to continue. These improvements generally result in catalysts that perform the same or better while using less precious metal loading -- a process known as "thrifting". We note that addressing the emission reductions necessary will not likely be the sole responsibility of the catalyst but will also be borne by the engine and its controlling systems.

To estimate the impact that our rule might have on long term prices of the three precious metals used in automotive catalysts, our contractor developed an econometric model to estimate the impact of our rule on market prices of rhodium, platinum and palladium. The contractor used the incremental loadings for each metal found in our RIA for this rulemaking, aggregated each metal for the entire US market, applied its model and estimated the possible long term impact on the market price of the three metals. The model predicted that Palladium could experience a price rise that would translate into about \$6-\$9 per LDV/T. The impacts on the other metals were smaller-- \$2-\$4 per vehicle for Rh and about 20 cents per vehicle for Pt.

The contractor concluded from its discussions with catalyst manufacturers that the metal

loading increases in our RIA for this rulemaking are probably very conservative. Using lower loadings in the contractor's model, of course, led to smaller long term increases in metal price.

The contractor also notes that the incremental price of palladium per vehicle is based on its current market price which is very high relative to past prices. We are not certain that the market can sustain this high price in the long run.

The contractor's report entitled "An Economic Analysis of the Response of the Platinum Group Metals Markets to a Change in Automobile Emissions Standards", is available in the docket for this rulemaking.

**COMMENT B:** EPA is realistic in its cost estimates for technology, while industry overestimates cost. **(California Air Resources Board (IV-F-126))**

**RESPONSE:** We did not receive any specific comment that our estimates for vehicle costs for gasoline-fueled vehicles were inaccurate. Therefore, we have not modified our cost analysis in response to any specific comments. We analyzed vehicle costs in detail for the proposal and we have reassessed the vehicle cost analysis for the final rule. We have made a few adjustments to "fine tune" the analysis but these changes have resulted in only modest adjustments to the costs. We believe that the technologies needed to meet the standards have been invented, are well understood, and that the main changes will be improvements and upgrades to those technologies to meet the Tier 2 standards. Much of the development needed to meet the standards will be in the areas of optimizing emissions control systems and calibrations. The technologies are described in detail in Chapters 4 and 5 of the RIA.

**COMMENT C:** By failing to consider the entire cost of the light-duty diesel vehicle system, EPA has underestimated the costs of the proposed rule. EPA should more closely evaluate the costs and benefits of the proposed standards. The estimated cost of \$100 to \$200 per vehicle seems low, especially when much of the technology has yet to be invented. One independent source (not specified) estimated the compliance cost at \$1000 per vehicle. **(American Trucking Associations (IV-D-70), p. 4, Ohio Coalition for Vehicle Choice (IV-F-915), Pennsylvania Coalition for Vehicle Choice (IV-F-46))**

**RESPONSE:** While it is true that we did not consider the costs of meeting Tier 2 standards for diesel-fueled vehicles specifically, doing so would not have significantly affected the cost estimates or other analyses for the rulemaking. At present, diesel vehicles account for a very minute fraction (less than 0.5%) of total light-duty sales. Any difference in the costs for diesels compared to gasoline-fueled vehicles would amount to, at most, a dollar or two difference in the outcome of the analysis. Such cost differences could exist among gasoline-fueled vehicles as well, depending on the approaches taken by various manufacturers to meet the standards. For purposes of the rulemaking, we believe it is reasonable and appropriate to estimate costs for an average or typical vehicle within a given vehicle category, especially since gasoline-powered vehicles so heavily dominate these classes. Therefore, this is how we conducted our cost analysis.

**COMMENT D:** EPA underestimates vehicle costs by: failing to estimate costs for HLDT interim standards; assuming variable cost reductions of up to 20% for manufacturing learning curve impacts; assuming cost reductions as a result of continuing R&D; and assuming fixed cost recovery within 5 years. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 30)**



**RESPONSE:** We do not agree with the comment that we have not estimated costs for the interim standards for HLDTs and therefore have underestimated overall program costs. Although we have not specifically analyzed the per vehicle incremental cost of the interim standards for HLDTs, we do account for those costs within the cost analysis. The methodology we use to account for the costs of the interim standards is described in the RIA, as follows:

"For vehicles well above the standard, manufacturers could redesign the vehicles to meet the interim standards. However, we believe it is more likely that manufacturers would phase these vehicles into the interim standards later in the phase-in period and use the program averaging flexibility to meet the interim standard. Therefore, rather than project a cost for vehicles to meet the interim standards, we have projected sales of Tier 2 vehicles prior to 2008 to average with and off-set those exceeding the interim standards. We believe this approach is reasonable considering manufacturers are likely to avoid significant R&D efforts to meet a standard that is in effect for only a few model years. Essentially, a few such vehicle models would have to be immediately redesigned to meet Tier 2 levels. Due to timing considerations, manufacturers are more likely to focus their resources on meeting the Tier 2 standards."

This accelerated phase-in of vehicles to the Tier 2 standards within the averaging program remains a viable and likely approach for the manufacturers. The commenter did not provide comment on this methodology. We continue to believe that this approach accounts for the costs of the interim standards in a reasonable way. We believe this is especially true given that even the program proposed to EPA by the manufacturers was based on an averaging concept. It is our expectation that after accounting for vehicles/engines already targeted for replacement in this time frame and those being modified to deal with the California LEV II program, manufacturers will maximize carryover of vehicles through averaging.

The commenter believes that applying the learning curve for each doubling of cumulative production may be optimistic. We would agree that for Tier 2 applying the learning curve for each doubling of production could be optimistic. As described in the RIA, to avoid overly optimistic projections, we included several constraints. To be conservative, we did not incorporate cost reductions due to the learning curve beyond the first doubling of production. We applied the learning curve reduction only once because we anticipate that for the most part the Tier 2 standards would be met through improvements to existing technologies rather than through the use of new technologies. With existing technologies, there would be less opportunity for lowering production costs.

As discussed in the RIA, the learning curve is a well documented and accepted phenomenon. For variable costs, research in the area of costs of manufacturing has consistently shown that as manufacturers gain experience in production, they are able to apply innovations to simplify machining and assembly operations, use lower cost materials, and reduce the number or complexity of component parts. We believe that to ignore its potential impacts on costs altogether, as the commenter seems to suggest, would be overly pessimistic and inconsistent with what industry experience has shown to be true. The data contained in the studies on the learning curve, referenced in the RIA, support the commonly used factor of 20 percent, which is approximately the average factor for the industries included in the studies.

With regard to R&D, we did not lower cost estimates over time on the basis of continued R&D effort by the manufacturer. We projected that all R&D would occur prior to vehicle production. The RIA notes that we believe that the R&D costs are likely overstated because the projection ignores the carryover of knowledge from the first vehicle lines designed to meet the standard to others phased-in later.

The commenter believes that it is unrealistic to assume that fixed costs are recovered over the first five years of production of a vehicle model. In response, EPA uses this projection as a mechanism to account for how pre production costs are distributed over vehicle sales in order to estimate per vehicle costs and annual aggregate costs. We have used the five year recovery period in several cost analyses in the past, based on industry practices. The commenter does not offer its own estimate or any rationale supporting why five years is inaccurate. Some manufacturers may use a shorter period and some a longer period, but we continue to believe that our methodology is an appropriate way to address these costs.

### Issue 23.1.2: Other Vehicle Cost Issues

**COMMENTS A, B, D, and E:** Several commenters state that the estimated cost of \$200 per vehicle is reasonable given the air quality and health benefits that will be achieved. However, others argue that the estimated cost of \$200 per vehicle is not reasonable and would fall heavily on farmers whose livelihood requires that they drive trucks. If the Tier 2 compliance costs are excessive, the cost of new vehicles will be too high, which will lower sales and/or may affect the ability of individuals to afford a new vehicle, the ability of small businesses to compete, or the ability of local governments to obtain the vehicles necessary to properly maintain operations. The Tier 2 program could affect the affordability and utility of HLDTs. (AAA Ohio Motorists Association (IV-F-72), American Corn Growers Association (IV-D-206), American Farm Bureau Federation (IV-D-143), American Lung Association (Atlanta) (IV-F-132), Christenson, C. (IV-F-90), Clean Air Conservancy (IV-F-75), Clean Air Network, et. al. (IV-F-95), Cohen, David L. (IV-F-23), Evangelical Environmental Network (IV-F-22), Fletcher, Robert E. (Atlanta) (IV-F-132), Franklin County (OH) (Cleveland) (IV-F-134), Georgia Coalition for Vehicle Choice (IV-F-34), Georgia Food Industry Association (IV-F-11), Group Against Smog and Pollution (IV-F-45), Hester, Randy (Philadelphia - Day 1) (IV-F-131), Kondas, L. (IV-F-66), Mason, P. (IV-F-70), McCaskill, Foster (Atlanta) (IV-F-132), Miller, C.R. (IV-F-63), National Black Chamber of Commerce (IV-D-18), National Indian Business Association (IV-D-17), National Indian Business Association (Philadelphia - Day 2) (IV-F-131), Ohio Coalition for Vehicle Choice (Cleveland) (IV-F-134), Oregonians for Clean Air (IV-D-202), Pennsylvania Automotive Association (Philadelphia - Day 1) (IV-F-131), Pennsylvania Coalition for Vehicle Choice (IV-F-46), Perkul, Betty (Cleveland) (IV-F-134), Rohm and Haas, Agricultural Chemicals Division (IV-F-25), Shumann, Noel (Atlanta) (IV-F-132), Sierra Club, Northeast Ohio Group (IV-F-103), Sierra Club, Ohio Chapter Energy Committee (IV-D-101), Smith, Tom (Cleveland) (IV-F-134), Sweeny, Shawn (Cleveland) (IV-F-134), Weaver, Heidi (Philadelphia - Day 1) (IV-F-131), White, Randall F. (IV-F-10), Wilson, Bob (Atlanta) (IV-F-132), Wisconsin Transportation Builders Association (IV-D-185), World Satellite Network (IV-F-137))

**RESPONSE:** As discussed in the response to comments in Issue 23.1.1, we believe that our estimates for the cost of technology improvements to meet Tier 2 standards are reasonably accurate. We believe that it is very unlikely that costs would be significantly higher than those we have projected. We agree with Comment A that the costs are reasonable considering the air quality and health benefits achieved, as discussed in detail in our cost effectiveness and benefit cost analyses.

In response, then, to comments concerning affordability, we do not believe costs will be excessive, lower new vehicle sales, or have a widespread affect on individuals or businesses ability to afford new vehicles. Assuming manufacturers pass along the cost increase to consumers, the estimated incremental costs would represent about a one percent or less increase in the cost of HLDTs. Most HLDTs have a base retail price in the \$20,000 to \$30,000 range.<sup>5</sup> For other types of vehicles, the increase is significantly less than one percent. In addition, the American Lung Association provided survey data in support of the rule indicating strong public support for more stringent standards, especially with regard to HLDTs, and a willingness to pay for improved vehicles on the part of consumers.

We do not believe the magnitude of the increases compared to the base price of the vehicles raises significant concerns regarding the ability of consumers to purchase new vehicles. Other factors in the overall economy are likely to have a much greater effect on

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<sup>5</sup> "Ward's 1999 Automotive Yearbook", Ward's Communications, 1999.

the decision whether or not to buy a new vehicle. In addition, the marketplace generally determines the price of new vehicles. This is evident in the HLDT market segment where strong demand has lead to high profit margins for these vehicles.

Comments regarding performance and utility of HLDTs are more closely related to technological feasibility than vehicle cost and are therefore addressed under Issue 26.

**COMMENT C:** To contain vehicle costs, the Tier 2 program should be as consistent as possible with California's program. **(Pennsylvania Automotive Association (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** In response to Comment C, EPA directionally agrees with the comment and has made a number of modifications to the proposal which would enhance the ability for manufacturers to harmonize vehicle offerings with California. These changes are discussed in the response to comments on specific aspects of the vehicles program contained in Issues 4, 6, and 8. Many of these changes have been made to allow manufacturers to avoid unnecessary duplication of effort for federal and California vehicles. While differences between the Tier 2 program and the California program remain, manufacturers would be able to harmonize vehicle offerings to a substantial degree if they so choose.

## **Issue 23.2: Gasoline Sulfur Control Costs**

### **Issue 23.2.1: Accuracy of Sulfur Control Cost Analysis**

**COMMENT A.1:** EPA has underestimated the implementation costs of sulfur reduction technologies. For example, EPA underestimates the sulfur levels of certain components of the feedstock (such as alkylate, MBTE, and ethanol). As the focus shifts to low levels of sulfur (<30 ppm), it is important to consider with an increased degree of accuracy the sulfur levels in all blendstocks. **(American Petroleum Institute (IV-D-114), p. 84-86, Black & Veatch (Philadelphia - Day 2) (IV-F-131), Giant Industries, Inc. (IV-D-66), p. 2, Marathon Ashland Petroleum LLC (IV-D-81), p. 5-6, National Petrochemical and Refiners Association (IV-F-19)) (See other letters listed under Comments A.2 through A.17 that follow.)**

**RESPONSE:** For our cost analysis for the NPRM, we assigned alkylate a sulfur level of 10 ppm which was derived from two sources of information. One source was the information submitted by refiners to calculate 1990 individual baselines under the RFG and antidumping regulations. These submissions contain alkylate sulfur levels for those refiners which had to provide that information. The alkylate sulfur levels of 9 refineries, for which we had information, averaged about 20 ppm. The second information source was several refining industry consultants which use refinery models to model changes in refining operations. We asked them what sulfur levels they used for alkylate in their refinery models. The sulfur levels they assigned to alkylate ranged from 0 - 20 ppm. For the NPRM we assumed that, if actual alkylate sulfur levels are closer to 20 ppm and refiners are faced with our proposed 30 ppm gasoline sulfur standard, refiners would improve the operations of the alkylate plant and bring their alkylate down to 10 ppm.

Since the NPRM, we did some additional work to better understand alkylate sulfur levels. Of the refinery-specific alkylate sulfur levels which we obtained from the 1990 RFG baselines, one was over 100 ppm, which was about an order of magnitude higher than the others. We called the engineering staff of that refinery and found out that their alkylate sulfur level is lower now, dropping from 135 ppm reported in the baseline submission, down to about 20 ppm due to better operation of their unit now compared to how it was operating in 1990. With this lower alkylate level, the average sulfur level of alkylate of the refineries we analyzed dropped to 7 ppm. To simplify our analysis and to add a margin of safety to our estimates, we rounded the 7 ppm average up to 10 ppm.

We did not assume or calculate that refiners would use a particular mix of high octane oxygenates to meet an octane loss associated with desulfurization. Instead, we assumed that refiners incurred a cost for recovering lost octane consistent with the price difference between premium and regular grades of gasoline. However, we recognize that unless oxygenate use were to be restricted, refiners may use oxygenates as part of a strategy to recover the lost octane. The sulfur level of the two most important oxygenates are discussed next.

In the case of Ethanol, the sulfur level is estimated to be about 20 ppm and it is from the gasoline which is blended into ethanol as a denaturant. With an extensive reduction in gasoline sulfur level, ethanol's sulfur level is expected to drop by about an order of magnitude and be virtually insignificant when blended into gasoline.

The sulfur in MTBE comes from either shipping the MTBE through pipelines where it mixes with residual high sulfur petroleum compounds, or from the isobutylene produced in the refinery which is used as a raw material. After speaking with a number of consultants and refiners, we believe that, currently, MTBE averages about 20 ppm by weight in sulfur. With a dramatic reduction of sulfur in gasoline, the sulfur level in MTBE is expected to diminish to less than 10 ppm.

Thus, we analyzed the sulfur contribution of feedstock components in our feasibility analysis, and concluded that, with lower sulfur gasoline, both MTBE and ethanol sulfur levels are expected to decrease relative to today's levels. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

**COMMENT A.2:** EPA's analysis fails to consider the desulfurization costs that will occur when low sulfur blendstocks are temporarily unavailable due to upsets or planned maintenance. **(American Petroleum Institute (IV-D-114), p. 84-95, Marathon Ashland Petroleum LLC (IV-D-81), p. 6)**

**RESPONSE:** There are several very low sulfur blendstocks in the refinery. These include reformate (about 35% of gasoline), alkylate (about 10 percent in gasoline) and isomerate (less than 10 % of gasoline). Each of these blendstocks are produced by different processing units in the refinery, thus, no two units would be expected to go down at the same time. The worst case would be if the reformer went down, since reformate comprises the largest portion of the gasoline pool of these several low sulfur blendstocks. Most of reformate is blended into the premium pool (perhaps as much as two thirds of premium could be reformate in low sulfur gasoline). Premium usually has half the sulfur of regular gasoline, so if the gasoline pool must meet a 30 ppm averaging standard, the premium pool would probably average less than 20 ppm. If the reformate half of the premium pool would suddenly be unavailable, the most that the sulfur level of the premium pool could increase to is 40 ppm. Similarly, the regular gasoline pool may average 35 ppm for the whole pool to average 30 ppm. If the reformate portion of the regular pool were to be unavailable, that pool's sulfur level would increase to about 50 ppm, still below the cap standard. We believe the most significant problem to refiners when there is a temporary loss of reformate is meeting their octane targets, not meeting the sulfur requirement (the problem of meeting octane targets poses the same problem for refiners now as it would with a gasoline sulfur program in effect).

In addition, we believe that refiners will operate below 30 ppm on average for most of the year (we assumed that refiners would average 25 ppm on average in our cost analysis) so when there are problems in the refinery, the refiner will be sure to meet the 30 ppm averaging standard for the entire year. Thus, the risk of exceeding the 80 ppm cap is lower yet if each refinery's gasoline pool is normally a little lower than 30 ppm.

**COMMENT A.3:** EPA underestimates the cost in part because it has erroneously concluded that existing FCC feed hydrotreaters are being underutilized. The basis for EPA's analysis of hydrotreater utilization rates appears flawed and may fail to account for downtime associated with periods such as maintenance, repairs and upsets. Given their cost and value, refineries already operate these units to the maximum extent possible. Also, EPA assumes that desulfurization units will be used at 95% of capacity, which is too high for such units, 90 percent is more likely. **(American Petroleum Institute (IV-D-114), p. 86-87, National Petrochemical and Refiners Association (IV-G-67), P. 12)**

**RESPONSE:** It is difficult to respond to this comment, since EPA presented a rationale in the rule for its projection of excess FCC feed hydrotreating capacity and the commenter presents no new information to support his claim. However, our final rule analysis addresses the commenter's concern, since we changed our cost estimation methodology and now assume in our analysis that available FCC feed hydrotreating capacity is already being used to lower gasoline sulfur levels. We assume that FCC hydrotreating capacity is being used now because we tabulated the gasoline sulfur data for the 1998 calendar year and discovered that average gasoline sulfur levels in the U.S. dropped by about 35 ppm, and we presume that this drop is at least partially due

to the use of excess capacity of these units that existed at the time of the API/NPRA survey.

For sizing the capital investments, we assumed that the desulfurization units would operate at 93 percent of capacity, not 95 percent. This is consistent with the stream day operation fraction in the Oak Ridge National Laboratory (ORNL) refinery model for the FCC unit, which this desulfurization unit would be paired with. For naphtha desulfurization units, the ORNL refinery model uses 94 percent which is even higher. However, because the FCC gasoline desulfurization unit cannot operate if the FCC unit is not operating, we used the more conservative 93 percent.

**COMMENT A.4:** EPA underestimates by incorrectly not accounting for gasoline produced by California refiners. The data show that this gasoline averages 117 ppm, so EPA should consider the cost impacts for the CA refiners. The analysis appears to include some form of cost for these refiners but it is unclear at what levels and how those cost levels were determined. (**American Petroleum Institute (IV-D-114), p. 87, Marathon Ashland Petroleum LLC (IV-D-81), p. 6**)

**RESPONSE:** The commenter incorrectly assumes that our analysis fails to include the cost to California refiners who produce gasoline for sale in the rest of the U.S. To estimate the cost of California refiners desulfurizing their non-California gasoline, we conservatively assumed that the cost incurred would be the same as for refiners outside of California, which must start from a gasoline sulfur level of about 300 ppm. However, as the commenters note, California refiners have a much lower gasoline sulfur starting point and this should allow them, with the desulfurization technology which they already have in their refinery, to desulfurize their gasoline much more cheaply than other refiners. Thus, rather than underestimating costs, our consideration of California refiners' costs is a conservative estimate.

**COMMENT A.5:** EPA underestimates by using an unrealistic return on investment figure in its calculations. The cutoff criteria used by the refining industry when analyzing capital projects and alternatives is approximately twice the 8 percent ROI used by EPA in assessing costs. (**American Petroleum Institute (IV-D-114), p. 87, Murphy Oil USA, Inc. (IV-D-117), p. 2**)

**RESPONSE:** We are aware that refiners typically perform their cost estimates amortizing their capital costs at a 15% ROI. The purpose of using a high ROI as a capital cost hurdle is to estimate and compare the cost-effectiveness of projects, for choosing the most cost-effective project, with a bias against capital cost investments, since such investments are sunk once they are made. EPA did not try to compare different desulfurization technologies to determine whether a desulfurization technology met a refiner's criteria for installation in the refinery. This is because FCC gasoline desulfurization is a lower capital cost strategy for desulfurizing gasoline compared to the other alternative, which is FCC feed gasoline hydrotreating. Many refiners have communicated to us that they would use FCC gasoline desulfurization if they were faced with a gasoline sulfur standard such as the standard which we proposed. Also, we don't know of any operational change that, by itself, would allow the refining industry to meet the gasoline sulfur standard. Finally, desulfurizing gasoline is an investment to stay in business, not to improve a refiner's financial standing; thus refiners will have to make these investments if they will want to continue to produce gasoline.

**COMMENT A.6:** In addition, the Agency has assumed that the emerging desulfurization technology, not yet commercially proven viable, will work as projected. EPA also has

assumed that all refiners will default to use this technology. EPA also assumes that the technology will be capable of achieving these levels of sulfur at its projected cost calculations. Finally, EPA assumes that technology vendors will be able to supply the equipment and that virtually the entire industry will install these technologies all within a very brief period. These assumptions are overly optimistic and inappropriately reduce EPA's cost estimates. Refining industry commenters also note that CD Tech or OCTGAIN technology at this point in time presents too much risk to support selecting this technology. API notes that EPA states that "many refiners have shared with EPA that they may be hesitant to use these improved . . . technologies for gasoline desulfurization." Nevertheless, EPA's proposal, associated economics, and cost-effectiveness support has "assumed" that 100 percent of refineries will use such advanced technologies. API argues that EPA should revise their assumption about the degree to which the new technologies will be used, even though the existing technologies have an increased cost. One commenter also noted that refiners would be unlikely to use these technologies if diesel desulfurization will be required by EPA; if diesel desulfurization requirements will apply, then the RIA cost estimates should reflect the use of more expensive, traditional hydrotreatment methods. **(American Petroleum Institute (IV-D-114), p. 20, Koch Petroleum Group, LP (IV-D-72), p. 42, Marathon Ashland Petroleum LLC (IV-D-81), p. 9-10, 28, Murphy Oil USA, Inc. (IV-D-117), p. 2, National Petrochemical and Refiners Association (IV-D-118), p. 20, 53, Phillips Petroleum Company (IV-D-82), p. A5, Senate Comm. Materials (IV-D-229), Sen. Inhofe p. 3, Sinclair Oil Corp. (IV-D-150), Ex. 1, p. 7-8; Ex. 2, p. 6-7, Sunoco, Inc. (IV-D-73), p. 21-22, United Refining Company (IV-D-147), p. 2-3)**

**RESPONSE:** We address this comment several different ways. First, the final gasoline sulfur program requires compliance with a 30 ppm refinery averaging standard in 2005, rather than the proposed date of 2004. Second, the initial compliance date of October 1, 2003 was moved back to give refiners more time. These modifications, combined with various modifications to the ABT program which will make more credits available for compliance in the early years, will provide for an orderly transition to low sulfur gasoline by spreading out the time frame during which refiners will make capital investments to meet the standards. Thus, some refiners will have more time before they need to invest in capital which will allow them to observe desulfurization technology operating so they can choose among the technologies available with more confidence. This will also spread out the design and construction demand on consultation and construction firms.

Second, for 2004, we are basing our cost estimate on desulfurizing gasoline on a mix of half proven technologies (Exxon Scanfining, Mobil Oil Octgain 125, and IFP Prime G) and half improved technologies (CDTech, Mobil Oil Octgain 220). This addresses the commenter's concern that we should not assume 100 percent of refiners will be using the improved desulfurization technology. It is important to note that Mobil's Octgain process is in service now and that half of CDTech's desulfurization process, which is CDHydro, has already been demonstrated, while the second half of CDTech's process, which is CDHDS unit, is expected to begin operating in the Spring of 2000. Also, we know of 3 other CDTech units which will be going in (one in late 2000, and others thereafter), which demonstrates that some refiners are willing to take the risk of using an improved desulfurization process. Then in later years we assume that the lower cost and emerging absorption desulfurization technologies will be used much more frequently. See Chapter IV in the RIA for our summary of these technologies, and Chapter V for our estimate of the costs based on these technologies.



We do assume that these desulfurization technologies will work as claimed by the licensing companies. This is consistent with the gasoline desulfurization cost study by API and others. Also, all these licensors have extensive experience in designing and constructing refining processing units, which gives their information submissions credibility. We also have no basis for presuming that these technologies will not work as claimed, included the comment itself which provides no basis for adjusting the licensors' claimed performance.

We did consider whether if regulating diesel fuel further would result in refiners using a different strategy for desulfurizing gasoline. As summarized in the summary and analysis of comment Section 30, refiners have indicated that they will not choose a different gasoline desulfurization technology if they were faced with regulations for both gasoline and diesel fuel.

Designing and installing these desulfurization units for startup during the four years of the phase-in period is not expected to be a problem for either the licensing companies, nor for the engineering and construction firms. In section IVB of the RIA, we note the successful experience of the refining industry in meeting the 500 ppm maximum diesel sulfur standard which went into effect in 1993 and which required refiners to install the same types of technology which this rule will require. Also, that requirement was not phased in, so refiners had to install all the hydrotreaters within the same three year period. It is important to note that more refineries produce diesel fuel than gasoline, although some refiners chose to not produce onroad diesel thus avoiding the cost of putting in a hydrotreater. The licensing firms should not pose any limitation to refiners for getting their desulfurization units designed because there are so many of them, and the initial design work that they must do for refiners is limited. We spoke to some senior staff members of large engineering and construction firms who said that providing for the engineering and construction demands for the entire refining industry for the proposed gasoline sulfur program should not be a problem for them. For the early desulfurization units going in, those units are not required to be operating at 30 ppm early on so those refiners will have plenty of experience with those units before they have to meet the 30 ppm standard.

**COMMENT A.7:** Using conventional technology, EPA estimates the 30/80 gasoline sulfur standard would increase manufacturing costs 5.1 to 8 cents per gallon, or \$5.6 to 8.8 billion each year nationally. These costs are substantially higher than those estimated by EPA on the basis of new technologies. One commenter also noted that the cost to smaller refineries is disproportionately larger, increasing the risk of closure and unnecessarily higher consumer prices. **(Chevron Products Company (IV-D-62), p. 7, Koch Petroleum Group, LP (IV-D-72), p. 42, Murphy Oil USA, Inc. (IV-D-117), p. 2-3)**

**RESPONSE:** As we discussed in the Draft Regulatory Impact Analysis, the gasoline desulfurization cost estimate of 5.1 to 8 cents per gallon which was presented in the Sulfur Staff Paper was made based on the cost of using Mobil Oil's Octgain 125 desulfurization process, and was based a flawed refinery model which had a reformat sulfur level many times higher than actual levels. We estimate that this refinery model flaw increased our cost estimate by over a penny a gallon. Another problem with how we modeled the costs at the time of the Sulfur Staff Paper is that we did not allow the refinery model to use extractive desulfurization along with the Mobil Oil Octgain 125 unit. Since the Octgain 125 unit tends to saturate all the olefins, when deeper levels of desulfurization was needed, the model incurred a heavy octane penalty if the Octgain unit had to be operated alone, dramatically increasing the costs. This penalty and associated cost can be avoided by

coupling the Octgain unit with extractive desulfurization. In this cost analysis for the final rule, each of the fixed bed reactor naphtha desulfurization technologies are married with an extractive desulfurization unit. Finally, in that past study we presumed that refiners would use a capital and utility intensive approach for splitting out the FCC naphtha stream for desulfurization. The splitting column used in the Final Rule is more appropriate for the need since it only makes two cuts in the FCC gasoline stream. Because of these, and several other, modifications to our earlier analyses, our estimated desulfurization cost based on proven technologies is less than half of what we estimated in the Sulfur Staff Paper. The comment concerning small refiners is addressed in our responses to other comments C and G below in this subsection, and also in issue 18.

**COMMENT A.8:** Finding a place for the sulfur produced from hydrotreating would be an expensive chore in a location such as Alaska, which has no market for the material. The least expensive option would be to dispose of the sulfur as solid waste, an unlikely possibility. It might be shipped outside of Alaska to market, but the freight costs would not likely be offset by the sale. As is obvious, simply disposing of the sulfur will be an expensive challenge. **(Williams Companies, Inc. (IV-D-53), p. 2-3)**

**RESPONSE:** We understand that sulfur can be converted to sulfuric acid and used to produce a number of products, which includes fertilizer, inorganic and organic chemicals, pigments, and rayon.<sup>6 7</sup>

**COMMENT A.9:** EPA's claim that the benefits of the proposed program are as much as five times the cost is based on the use of desulfurization technology that is not yet commercially proven and which refiners may not be able to employ within the required timeframe. EPA's benefit estimates are based on epidemiological data that have not been released for external review and on highly questionable valuation subjects. **[See same point under Issue 25.2, Comment (A)(1)] (Marathon Ashland (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** See the response to 23.2.1.A.6 above and Section VB of the RIA for our response to the comment on costs. The comment on health effects is addressed in section 25 of this document, and in the RIA.

**COMMENT A.10:** EPA's attempt to estimate octane costs as a variable operating cost inappropriately confuses "price" and "cost". The price of a product at retail is not necessarily a good indicator of its cost. Further, current octane cost may not be reflective of future octane cost because of the uncertain future for MBTE. Commenters state that EPA also needs to address the potentially significant cost impacts of octane concerns with desulfurization in the event that MBTE is unavailable. **(American Petroleum Institute (IV-D-114), p. 87-88, Marathon Ashland Petroleum LLC (IV-D-81), p. 8, 39, Senate Comm. Materials (IV-D-229), Sen. Inhofe p. 4)**

**RESPONSE:** The octane cost we used was based on the difference in price between premium and regular grades of gasoline at the refinery gate, which are the wholesale prices, not retail prices, and which should closely match the differential cost of producing the different products. Our octane cost estimate was corroborated by the Mathpro refinery

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<sup>6</sup> McMoran Exploration Co., 1998 Annual Report and Form 10K.

<sup>7</sup> Shreve, R. Norris, Brink, Joseph. A., Chemical Process Industries, McGraw Hill, 1977.

modeling study for API which estimated an octane cost of 0.6 cents per octane number  $((R+M)/2)$  per gallon, compared to our 0.7 cents per octane number per gallon. We address the possible phase down of MTBE use in gasoline in our response to comments in section 31.

**COMMENT A.11:** EPA has inflated the benefits of the Tier 2 proposal by a factor of at least 10 and has underestimated by 50 percent the cost of a desulfurization technology, which the Agency is not allowing the industry to use due to time constraints. The true cost-effectiveness of EPA's Tier 2 program is \$50,000/ton of  $\text{NO}_x$  and NMHC. This whole program, using EPA's estimates, will cost \$60 billion in vehicle and fuel costs through 2020. Commenter estimates the costs will be closer to \$100 billion. And the net benefit is a modeled reduction of an ozone level decrease of .0004 ppm, that can not be measured by current ozone monitors. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 3)**

**RESPONSE:** As summarized in A.6, above, we addressed comments about the phase-in and the cost analysis of our gasoline sulfur program in a number of ways. We made the initial portion of the sulfur program less stringent and exempted more small refiners which phases in capital investments over a longer time period, and we based the estimate of the first year's desulfurization cost on both proven and improved desulfurization technologies. Thus, we believe we captured the cost of those conservative refiners which may not invest in the improved desulfurization technologies. Also in our cost analysis we captured the lower gasoline desulfurization cost of adsorption technologies which we believe some refiners will likely use during the later years of the program phase-in.

**COMMENT A.12:** The NPRM indicates that the cost of a hydrotreater for a medium-to-large refinery may exceed \$100 million. This cost is significantly understated by a factor of three to six, when all aspects of such programs are considered. The vendors often give a low estimate of the ISBL cost which requires a multiplier of 1.5 to 2.0. Off-sites cost are added to this cost to obtain the realistic cost. **(American Petroleum Institute (IV-D-114), p. 21, Marathon Ashland Petroleum LLC (IV-D-81), p. 8)**

**RESPONSE:** We estimate the investment cost of a naphtha desulfurization unit to be about \$50 million for a medium to large refinery, and on the order of \$100 million for fluidized catalytic cracker (FCC) feed hydrotreating unit. However, we expect very few refiners to install FCC feed hydrotreaters. API's capital cost estimate for desulfurizing gasoline based on a notional refinery to 40 ppm is about \$50 million, which agrees well with our cost estimate. The adjustments we make to those capital costs in our cost estimates to account for geographical differences in capital costs and outside battery limit costs are from Petroleum Refining, Technology and Economics, Third Edition (1994) by Handewerk, Glenn and Gary, James. We are not aware of any report which recommends increasing the inside battery limit (ISBL) costs provided by vendors, and to our knowledge such adjustment factors to the ISBL were not used in other recent studies of the cost to desulfurize gasoline, including the study completed recently by API.

**COMMENT A.13:** The cost estimate of 1.7 cents/gallon was based on a simplistic spreadsheet calculation and cannot be used to support the cost projections of a rule of this magnitude. **(Sunoco, Inc. (IV-D-73), p. 22)**

**RESPONSE:** We believe that our refinery model is adequate for estimating the cost of desulfurizing gasoline. In fact, one major oil company uses a similar methodology for evaluating the potential major capital changes to their refineries. As we pointed out in the NPRM RIA, traditional refinery models can capture more details of the cost due to their complexity, however, when applied to address the costs of regulatory programs, these

models by necessity address the production of gasoline from a slate of many different crude oils at the same time. While these models include more complexity, such as the actual production of high octane components, they also include more uncertainty and approximations due to the combination of streams which would be separate in the refinery. Sometimes, the computational processes which combine, modify and separate these refinery streams hinders the implementation of straightforward chemical processes such as naptha desulfurization. Compliance with our sulfur program is widely expected to be achieved through the removal of sulfur from FCC naptha, with little or no impact on the important properties of this stream (except for sulfur), such as octane and volume. Thus, a simpler spreadsheet model can address the key features of adding such a technology without addressing all of the intricacies of crude oil distillation, coking operations, reforming, etc. Individual refiners may be able to modify these operations in order to reduce the cost of compliance with our sulfur program. However, modeling the cost for individual refineries is and always has been beyond the scope of any EPA or industry studies of regulatory requirements. It is also not possible without a great deal of proprietary data which is only available to each refiner. Perhaps most importantly, our estimate of the cost of desulfurizing gasoline is corroborated by API, NPRA, and AIAM cost estimates based on the work by Mathpro. The reader is directed to see the regulatory impact analysis for these cost comparisons.

**COMMENT A.14:** Contrary to EPA statements, not all ancillary costs are captured in the Mathpro analysis. Product reblending, safety margins for downstream enforcement, unit downtime, and overly optimistic projections are all real costs that cannot be modeled. (Sunoco, Inc. (IV-D-73), p. 22)

**RESPONSE:** We believe we covered any costs associated with each of these issues raised by the commenter. Our interpretation of what the commenter means by product reblending is that from time to time the refiner may produce batches of gasoline which do not meet the sulfur cap standard (and those batches will need to be reblended into the following gasoline batches). We believe that this will happen rarely, as refinery gasoline blenders, using today's computer models, are capable of meeting gasoline specifications for each and every batch. They will be blending gasoline to meet the averaging standard, and the cap standard is well above the averaging standard which gives blenders a wide safety margin. For the rare case when batches are produced offspec, the batch could simply be blended with a following batch to meet the cap standard. Whatever cost there might be associated with this situation should be covered by our contingency factor and the additional tankage which we have included. The safety margin for downstream enforcement is covered by the large margin between the averaging standard, and the cap standard. We also incorporated cost in our final rule cost estimate for refiners to regularly produce 25 ppm gasoline which should provide a safety margin for the averaging standard, and an additional safety margin for the cap standard. It is not clear what the commenter meant by overly optimistic projections. However, our contingency factor is meant to cover other costs not specifically covered in our cost analysis, and the factor we chose is one which is typical for this type of cost analysis.

**COMMENT A.15:** The Department of Energy analysis shows that the likely cost of achieving the 30 ppm standard is about 2.9 cents per gallon for typical "mid-challenged" refineries, about 50 percent higher than EPA has estimated for the "average" refinery. Manufacturing cost of the 30 ppm gasoline could be even higher for the third of the industry identified as "high-challenged" refineries. The analysis results are not worst case as they are premised on successful use of the new, and as yet unproven, CD Tech hydrodesulfurization technology and a refinery size (about 190,000 b/d) that is above the current U.S. average. Commenter provides supporting case studies prepared by the Oak Ridge National Laboratory Center for Transportation Analysis. Commenter also provides study prepared by the Petroleum Division of the Energy Information Administration. This

latter study examines the sulfur reduction challenge that various classes of refineries will face and provides a detailed breakdown of how smaller refineries are situated within these classes and geographically. **(U.S. Department of Energy (IV-D-121), p. 6)**

**RESPONSE:** These comments are addressed in Chapter V of the RIA. In essence, what we say there is that a large portion of the cost difference is accounted for by how the capital costs are handled (we use a 7% ROI before taxes versus DOE's 10% ROI after taxes) and by the energy intensive FCC splitting technology used by the DOE refinery model. By adjusting the DOE costs for the difference in how the capital costs are amortized, and for the extra costs due to the use of the energy intensive splitting column, the remaining difference may be explained by our observation that the DOE refinery modeling work seems to have chosen an investment path which most, if not all, refiners would not choose.

**COMMENT A.16:** The total industry investment requirements will be \$5-10 billion, greater than EPA has estimated. **(U.S. Department of Energy (IV-D-121), p. 6)**

**RESPONSE:** Our capital investment cost estimate is consistent with the low range value of DOE's cost estimate. It seems that the DOE range is higher than our estimate because of the reasons stated in our response to Comment A.15, above.

**COMMENT A.17:** The incremental cost of achieving sulfur reductions is greater than EPA has estimated. The Department of Energy analysis suggests a cost of between ½ and 1 cent per gallon for each 10 ppm change in the 30 ppm range, such as from 40 ppm to 30 ppm. This means that each 10 ppm change in the sulfur level of gasoline costs between \$.5 and \$1 billion per year. **(U.S. Department of Energy (IV-D-121), p. 7)**

**RESPONSE:** DOE's high incremental cost for meeting 30 ppm standard compared to a 40 ppm standard is affected by the capital amortization methodology and the technologies used. As stated above in response to Comment A.15, the capital portion of DOE's cost needs to be adjusted to be comparable to our estimate, and the technology used by DOE's refinery model seemed to be inappropriate.

**COMMENT A.18:** The RIA offers a number of options refiners have to meet the standards employing operational changes only, avoiding capital investments, i.e., running existing desulfurization units harder; debottlenecking the units; using more effective catalysts; using sweeter crude oils; FCC additives; undercut; FC C gasoline; blending in low sulfur oxygenates. The RIA greatly oversimplifies these options and their real world limits. **(NPRA (IV-A-10), p. 4-6)**

**RESPONSE:** While EPA mentioned these techniques as providing reductions in sulfur content without requiring major capital investment, we did not project that refiners could utilize these techniques in the long term to meet the 30 and 80 ppm final sulfur standards. In the FRM, we only project that refiners will utilize these techniques when they are currently exceeding the 300 ppm interim cap and desire to delay construction of new desulfurization equipment. Use of these techniques by a limited group of refineries for a short period of time appears to be consistent with the information presented by NPRA.

**COMMENT B:** A properly conducted modeling analysis will result in costs higher than EPA's estimated 1.7 to 1.9 cent/gallon unit cost. Process performance is a key component of the cost reduction from proven to unproven technologies. **(American Petroleum Institute (IV-D-114), p. 91, Marathon Ashland Petroleum LLC (IV-D-81), p. 12-13)**

**RESPONSE:** We feel that the methodology we used to estimate the cost of desulfurizing

gasoline is adequate, and is in some ways superior to linear programming refinery models. Our methods cannot suffer from the effects of overoptimization which can yield costs which are too low when such mathematical models are used. However, a refinery modeler can overestimate costs if too many restrictions (called ratio controls) are put into place to correct for this overoptimization. Our methodology can overestimate costs since we don't compare our methodology to an array of possible desulfurization technologies, which is what a linear programmed refinery model would do, so we may not find the lowest cost method. Furthermore, we know that the cost estimation staff of a major oil company uses a similar methodology to what we use. On the other hand, our methodology can underestimate costs if the projections for new process performance or cost are overly or inappropriately optimistic.

Our costs are now based on a mix of desulfurization technologies, starting with proven and improved technologies in the first year, followed by improved and adsorption technologies in later years. Other cost studies are only based on one, sometimes two different technologies, thus we believe our cost analysis is more robust than the other cost studies in this regard. We compared the results of our cost estimation methodology on equal footing with these other studies and have concluded that our costs are very similar. The reader is directed to see that comparison which is contained in Chapter V of the RIA.

**COMMENT C:** EPA is encouraged to consider the implications on refineries other than an "average" refinery in their analysis. Costs can be three times higher for treating a stream two times higher in sulfur. **(American Petroleum Institute (IV-D-114), p. 85, Marathon Ashland Petroleum LLC (IV-D-81), p. 12, National Petrochemical and Refiners Association (IV-G-67) p. 14)**

**RESPONSE:** We did consider the effect of the proposed program on refineries other than the "average" refinery. Unlike many analyses conducted on this program which look at a single average or notional refinery which represents all refineries, we projected the cost impact on a typical refinery in each PADD. The analysis of the impact of proposed program on PADD 4 refineries is essentially an analysis of small refineries, which is likely the most challenged group of refineries. We also closely reviewed the results of the DOE study which looked at the impact of the proposed sulfur program on their definition of challenged refineries, which was defined to be those refineries which use higher sulfur crude oil and limited desulfurization capacity. Our analysis of these nonaverage groups of refineries is contained in the final regulatory impact analysis.

**COMMENT D:** Several commenters note that the production of low sulfur gasoline effects the energy requirements of refineries, and EPA has underestimated the cost impacts of the increased energy usage. The commenters cite several factors. First, increased desulfurization, replacement octane processing, and support facility processing require energy for heat, chemical reaction, and miscellaneous mechanical energy requirements (i.e., pumps, compressors, process steam, etc.). Second, hydrogen required for desulfurization must be generated from fuel streams, primarily natural gas. Finally, in some cases the desulfurized product is lower in energy content than lower sulfur product and additional energy is thus required to make up the lost gasoline energy. EPA's RIA recognized some of these impacts and reported an estimated energy consumption for 30 ppm gasoline of 50 MB/D. However, EPA's analysis has numerous deficiencies and greatly understates energy consumption. **(American Petroleum Institute (IV-D-114), p. 129-131, National Petrochemical and Refiners Association (IV-D-118), p. 74) (See other letters**

listed under Comments D.2 and D.3 that follow.)

**RESPONSE:** See response to Comment D.3, below.

**COMMENT D.2:** Under the CAA, EPA must consider, among other things, the energy effects of more stringent Tier 2 standards. One effect that EPA has not adequately addressed is the energy used to manufacture required quantities of gasoline, which, at very low sulfur levels, may have a significant impact. (**Flying J Inc. (IV-D-151), p. 3, National Petrochemical and Refiners Association (IV-D-118), p. 74-76**)

**RESPONSE:** See response to Comment D.3, below.

**COMMENT D.3:** Using DOE and Mathpro analyses, two commenters estimate an increased energy consumption of 13-27 percent, which is much higher than EPA's estimates. (**American Petroleum Institute (IV-D-114), p. 129, National Petrochemical and Refiners Association (IV-D-118), p. 74-76**)

**RESPONSE:** Consistent with the NPRM, we conducted two analyses. One is the cost estimate for which we calculated desulfurization cost and we used typical costs for the refinery to provide or purchase hydrogen and octane without specifying how they would be generated. However, for a separate energy analysis, we tried to include all energy demands in the analysis without using any representations for those demands. We specifically calculated the energy demands for FCC naphtha desulfurization, splitting FCC naphtha (when necessary), octane production by a reformer unit, and hydrogen production by a hydrogen plant. We did include the electricity needed to operate pumps and compressors and fuel gas needed to heat petroleum streams and make steam. In our energy analysis, we did not presume that any MTBE was blended into gasoline.

The final rule energy analysis incorporates a number of changes from the energy analysis made for the NPRM. For the final rule, we applied the 10 percent operating cost contingency factor to the energy analysis as well. Also for the final rule we calculated energy demand based on two classes of desulfurization technologies, the improved desulfurization technologies and the adsorption desulfurization technologies. For the fixed bed desulfurization technologies which are most efficient married with an extractive desulfurization unit and thus would require a distillation column for separating the FCC naphtha into two streams, we based our cost and energy estimates on a more efficient distillation column than what we used for the NPRM (see the RIA for a more detailed explanation). Based on this revised energy analysis, we conclude that the energy consumption in refineries will increase by 3.1 percent with the use of improved desulfurization technologies, and 2.1 percent with the use of adsorption technologies.

**COMMENT E:** EPA should consider using averages instead of caps to determine the real measure of emission benefits and to address any potential problems that may arise due to scheduled maintenance or other unscheduled downtime at refineries. (**Citgo Petroleum Corporation (IV-F-33)**)

**RESPONSE:** The average standard should not be used to analyze the impact of the sulfur standard on refiners during periods of either scheduled maintenance or unscheduled maintenance because during those situations, the refiner need only meet the per gallon cap standard providing that the refiner produces gasoline at lower than 30 ppm for the rest of the year. We presume that refiners will produce gasoline at 25 ppm sulfur to account for occasional batches higher than 30 ppm.

**COMMENT F:** EPA fails to consider the potential costs of building redundant hardware to allow refiners to stay within the cap during downtime--maintenance, turnaround, and outage--periods. [See also Issue 26.2.2, Comment G.] (**Citgo Petroleum Corp. (IV-D-126), p. 2-3, Murphy Oil USA, Inc. (IV-D-117), p. 4, National Petrochemical and Refiners Association (IV-D-118), p. 28**)

**RESPONSE:** For the NPRM, we used a methodology recommended to us by the American Petroleum Institute on how to include the cost of meeting the cap standard (it is the cap standard which may be exceeded when maintenance is being performed or when low sulfur gasoline blendstocks are temporarily unavailable). The recommended methodology is to estimate what the average gasoline sulfur level would be under a cap standard, and then base the cost analysis on that average gasoline sulfur level. The presumption is that the cost of meeting the average sulfur level would include the cost of meeting the cap standard. Also for the NPRM, we based our capital cost estimates on stream day throughput which increases the capital and fixed costs to account for downtime and maintenance. Since we used the oil industry recommended methodology and the stream day volume throughputs for the NPRM cost analysis, we presumed that we addressed these potential costs. However, based on the comments which we received, we rethought and modified our cost estimation methodology somewhat.

For the Final Rule, made a number of adjustments to account for costs of meeting the cap standard potentially not accounted for in the NPRM analysis. The 15 percent contingency factor adjustment which was applied to the size of capital in the proposed rule, is now applied to the final capital cost, and a 10 percent contingency factor is now applied to the operating cost. We are now assuming that refiners would desulfurize gasoline more severely, producing 25 ppm gasoline on a daily basis. If refiners average less than 30 ppm most of the time, they can blend in untreated FCC naphtha for a period time (because required maintenance has the hydrotreater shutdown) which may increase the average sulfur level to above 30 ppm, but not exceed the 80 ppm cap, and still produce gasoline which averages 30 ppm for the calendar year. Finally, our cost analysis now includes the cost for half of today's refineries adding a storage tank to store up 10 day's worth of FCC naphtha. We believe that these modifications cover any additional cost incurred by refiners constrained by the cap standard.

**COMMENT G:** EPA should provide additional information regarding why an auto industry funded study was used to determine the impact of the gasoline sulfur proposal on PADD IV refiners and should consider conducting its own study as part of the rulemaking. (**Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Thomas Questions, p. 1**)

**RESPONSE:** For the NPRM, we estimated the gasoline desulfurization cost to PADD 4 refineries, recognizing that these refineries tend to be the most financially challenged, and we compared their estimated cost to the estimated cost to other refineries in other PADDs. Because of the higher desulfurization cost which these refineries would bear, we proposed that small refiners be allowed more time to comply with our proposed sulfur standard. The PADD 4 study funded by the automobile industry provided another level of analysis than that provided by our cost study because it included a refinery closure analysis which was important in analyzing the impact on those refineries. We have not performed our own analysis on the potential for refinery closures in PADD 4, or for small refineries in general, for three reasons. First the automobile industry funded analysis was transparent enough for us to use the study (the analysis is clearly presented and the reader can form his own conclusions). Second, such an analysis is very subjective and the conclusions usually are driven by the assumptions used. Third, our cost analysis for the FRM showed much lower costs for PADD 4 refiners, compared to other refiners, than the cost in the NPRM, so we



believe that the risk of refinery closures is much lower.<sup>8</sup> The automobile industry study also included a cost analysis, however, because of how late in the process of developing the NPRM that we received that study, and other studies by NPRA, API and DOE, we left the job of reviewing the cost estimates by these studies to the final rule. These cost comparisons can be found in the RIA.

**COMMENT H:** EPA needs to consider the February 1999 NPRA study on PADD IV refinery costs which shows costs of 5.6 cents/gallon to meet a 40 ppm average. **(National Petrochemical and Refiners Association (IV-D-118), p. 53)**

**RESPONSE:** We have considered the PADD 4 gasoline desulfurization cost estimate made by NPRA, as well as other cost studies submitted to us, and our consideration of this cost estimate is located in the RIA.

**COMMENT I:** Commenter provides a MathPro analysis of net present value cost impacts that is conservative because it relies on EPA's overly optimistic assumption that all refineries will employ the new desulfurization technologies. **(American Petroleum Institute (IV-D-114), p. 104-109)**

**RESPONSE:** See our response comment to 23.2.1A6 and Section V of the RIA, where we describe our expanded analysis which includes proven technologies for 2004, and adsorption technologies in future years. We believe our assumed mix of technologies in this revised analysis is now the most realistic of any of the gasoline desulfurization cost studies conducted to date.

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<sup>8</sup> The cost analysis for the NPRM indicated that the gasoline desulfurization cost for PADD 4 refineries was about twice that of PADDs 2 & 3 which provides a large incentive for the PADD 2 & 3 refiners to market gasoline in the PADD 4 market. However, with the new provisions we put forth in the final rule for small refiners and using a more robust mix of desulfurization technologies, the desulfurization cost to PADD 4 refineries is only 1 ½ times higher than PADDs 2 & 3, which provides a much lower incentive for other PADDs to sell gasoline in PADD 4, and this leftover which is likely neutralized by the transportation cost of sending gasoline from those other PADDs into PADD 4.

### **Issue 23.2.2: Overall Energy Industry Impacts**

**COMMENT A:** According to some commenters, the compliance costs for refiners would be too high and may lead to shortages, price increases, and the closure of many refineries. Additional consumer costs for low sulfur gasoline would be 5 cents/gallon or \$5.7 billion annually. On a nationwide basis, the added cost of the EPA's proposal would total more than \$7 billion in new investments and substantially increase operating costs for the U.S. refineries. These high costs will result in the closure of some refineries. **(American Petroleum Institute (Philadelphia - Day 1) (IV-F-131), Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Senate Comm. Materials (IV-D-229), Marathon statement, p. 2, Norco Refining Company (IV-F-20)) (See other letters listed under Comments A.2 through A.5 that follow.)**

**RESPONSE:** Our estimated cost for desulfurizing gasoline is under 2 cents per gallon which is much lower than the commenter's estimate. Even the gasoline desulfurization cost study funded by the oil industry estimated a cost of 2.3 - 2.5 cents per gallon to desulfurize gasoline down to 40 ppm. As discussed in the RIA, this cost is similar to our cost estimate, especially after accounting for the differences in cost-estimation methodologies between our two studies. However, both cost estimates are much below the commenter's estimated cost of 5 cents per gallon. Associated with the much lower per-gallon cost, the capital costs would be much lower than that estimated by the commenter. We estimate the aggregate capital cost to the U.S. refining industry to be under \$5 billion. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

**COMMENT A.2:** Achieving the proposed gasoline sulfur standard of 30 ppm average in 2004 will require that roughly 100 refineries make capital investments typically in excess of \$50 million per refinery. For many refineries, this investment will exceed \$100 million. **(U.S. Department of Energy (IV-D-121), p. 4)**

**RESPONSE:** We project that on average refiners will invest about \$45 million dollars per refinery to desulfurize their gasoline. We acknowledge that for very large refineries, refiners could spend as much as 100 million dollars in investments for each of those large refineries, however, this very high cost is spread over the large volume of gasoline which those refineries produce. There are many other refineries which will spend less than \$20 million because of their small size. We interpret the commenter's intent was to summarize the enormous investment which the refining industry must invest in a short period of time. To avoid an investment crunch in the first year of the program, we made a number of changes to the proposed gasoline sulfur reduction program to allow U.S. refiners to spread out their investments over several years. These changes include more flexibility in the ability for refiners to generate credits, the delay in the implementation of the cap standard which applies for the first year of the phase-in and a less stringent phase-in cap standard for 2005, and the postponement of the 30 ppm refinery average standard by one year.

**COMMENT A.3:** Short term supply losses may occur if refineries shut down key units to bring this new desulfurization equipment on-line or if the equipment fails to perform as claimed. This could add incremental price pressure and price volatility. The ongoing California gasoline situation is exhibiting all of these price-increasing forces -- higher manufacturing costs for cleaner gasoline, longer term supply tightness, and short term supply losses. The consequences of this are that California consumers are paying, in the short term supply/demand imbalance situations, as much as 50 cents more per gallon for cleaner gasoline, not the 5 to 10 cents more per gallon that it costs, on average, to manufacture the gasoline in the California refining system, which has a high capability to produce very clean gasoline. **(U.S. Department of Energy (IV-D-121), p. 7)**

**RESPONSE:** The California situation is very different from that of the rest of the country. First, all California gasoline must meet the very stringent Phase II California clean fuel standards which not only includes a sulfur standard, but also requires dramatic reductions in olefins, aromatics and a significant increase in E300. In addition, the fuel market for California is very separate which does not allow price spikes to be buffered very well by imports from overseas or other parts of the U.S.. Gasoline produced outside of California does not typically meet California requirements, so a tanker of gasoline cannot simply be diverted from its destination to relieve California's situation. Much of the country outside of California does receive imports, or is impacted by imports brought into the East Coast, thus, price spikes can be moderated by these imports. Both Canadian and European gasoline will also meet stringent gasoline sulfur standards, so the gasoline from those countries could be shipped to the U.S. without any further refining, provided that the gasoline not have to meet federal RFG requirements. Some of Canadian and European gasoline may even meet federal RFG requirements due to other fuel specifications which applies in those countries. Additionally, with the phase-in, refiners will be starting up their desulfurization equipment in different years, and probably at different times of the year. Particularly, with the changes we have made in the fuel program for the final rule, investments across the industry will be spread out over a sufficiently long period of time to enable a smooth transition to low sulfur gasoline without market disruptions. For these reasons laid out here, we expect few or no price spikes during the implementation of this gasoline sulfur reduction program, and certainly many fewer problems than what has transpired in California.

**COMMENT A.4:** Shortages could occur regionally and/or nationally. EPA needs to consider the national security implications of the proposal given that domestic refining capacity is declining and the U.S. is becoming more dependent on foreign refining sources. **(Countrymark Cooperative, Inc. (IV-D-154), p. 4)**

**RESPONSE:** We are concerned about the national security implications of any gasoline shortages, however, the changes we made to our proposed rule should address any concerns. To address the potential for refinery closures, we maintained many of the flexibilities included in the proposed rule, and added more flexibilities in the final rule. These flexibilities include a small refiner program which now includes a similar program for the small refineries in PADD 4, in addition to the small refiners already covered there. We increased the cap standard during the second year and postponed the 30 ppm refinery average standard from starting in the year 2004 to start in 2005 to allow a greater number of refiners to make their investments in the following two years. We provided the opportunity for refiners to earn early credits more easily, and we are providing flexibility in how credits can be earned under the corporate cap standard, and how they can be used. Many of these changes were shaped during discussions with the Department of Energy, which is very committed to the viability of the refining industry. We think that these measures will help the domestic refinery industry produce lower sulfur gasoline without any associated loss of gasoline output due that could occur due to refinery closures.

**COMMENT A.5:** EPA's RIA fails to include an adequate assessment of the economic impact on the refining industry. The RIA has two pages of unsupported conclusions on which EPA relies to assume that no refineries will have to close. Commenter refers to the MathPro analysis conducted for the auto industry and a report prepared for Environment Canada that shows cost differences between refineries of 2 to 8.6 cents per gallon. Those differentials could reduce refinery margins sufficiently to place a number of refineries at risk of closure, which is consistent with findings in Canada and Western Europe as those areas contemplate low sulfur gasoline requirements. Given the strong indications from the refining industry and others concerning the risk of refinery closures, EPA must prepare a more comprehensive analysis of this concern. **(National Petrochemical and Refiners Association (IV-D-118), p. 56-59)**

**RESPONSE:** We discussed the issue of small refinery closures, both in the context of small refiners and small refineries owned by larger refiners, with the Western Governors Association. Since the implications of a low sulfur program are potentially the most severe for those refineries in the West, and other refineries similar in size to those Western refineries, we feel that by addressing their concerns that we have adequately address the issue of refinery closures. The response made to comment (A) (4) addresses this issue further.

**COMMENT B:** Lowering gasoline sulfur will have an impact on gasoline supplies. A gasoline sulfur reduction program that goes too far too fast is likely to have unwarranted, negative economic impact on the domestic refining industry, with associated shutdowns, layoffs, adverse impacts on local economics, etc. EPA can minimize these impacts by adopting a schedule that allows for less aggressive investment and short term cost impacts and permits lower-cost solutions to develop. **(Conoco, Inc. (IV-F-120), National Petrochemical and Refiners Association (IV-D-118), p. 24-27, 56, Norco Refining Company (IV-F-20), Ports Petroleum Company, Inc., et. al. (IV-F-64), Senate Comm. Materials (IV-D-229), Sen. Inhofe p. 1, Sinclair Oil (Denver) (IV-F-133), Valero Energy Corporation (IV-F-78)) (See other letters listed under Comments B.2 through B.6 that follow.)**

**RESPONSE:** See responses on adjusted schedule made in response to Comment A.4, above.

**COMMENT B.2:** A lower gasoline sulfur requirement will reduce the already strained U.S. gasoline production capability. The extent of reduction will depend on individual refinery configuration, initial sulfur levels, and strategies employed to reduce sulfur. However, the generally poor economic state of the oil industry will tend to cause some refiners to choose to treat the gasoline components rather than choose feed pretreatment options. This low cost tends to reduce gasoline supply. One commenter provides further information, and cites to aggregate average cost studies by DOE and MathPro. These data show production declines ranging from 103 MB/D to 526 MB/D (excluding CA). Actual production decline may be greater if refiners choose to minimize capital investment and reduce sulfur through operational changes. For example, a refiner could achieve some sulfur reduction by diverting the high sulfur heavy end of the catalytic cracked gasoline to distillates, reducing gasoline sulfur and volume as well. Another commenter discusses desulfurization impacts on yields to show the loss of supply that is likely to occur. **(American Petroleum Institute (IV-D-114), p. 127-128, Flying J Inc. (IV-D-151), p. 3, National Petrochemical and Refiners Association (IV-D-118), p. 70)**

**RESPONSE:** FCC gasoline desulfurization is expected to be the methodology of choice by refiners for desulfurizing gasoline. Some FCC gasoline desulfurization technologies cause some loss in FCC gasoline volume, while others do not. Averaged over the desulfurization technologies expected to be used, we estimate that there would be about a 20 million barrel per day loss in gasoline volume. This loss, which occurs only one time as the industry starts up the desulfurization units, is one quarter of one percent of the volume of gasoline consumed in the U.S., and less than one fourth of the increase in gasoline production by the refining industry each year for meeting increased domestic demand. In future years, adsorption desulfurization technologies are expected to replace the proven and improved technologies which will be installed in the beginning years of the gasoline sulfur program. Adsorption desulfurization technologies cause no yield loss, so in future years if refiners switch over to these technologies as expected, any yield loss incurred in the initial years of the program will be gained back. The comments apparently reflects a worse case scenarios, however, we expect there to be a much lower loss in gasoline

volume.

The yield loss will cause a number of possible outcomes. Either the domestic refining industry will make up the gasoline volume loss, or the loss will be made up by imports. There may be a small increase in the price of gasoline, initially, which would initiate these adjustments, however, the price of gasoline will stabilize and the demand will be met.

**COMMENT B.3:** In proposing the arbitrary 30 ppm standard, EPA has ignored the supply impacts. The proposed gasoline sulfur rule will further weaken the U.S. refining industry, which may lead to higher imports of refined products, higher prices, shortages, and/or supply disruptions. **(American Petroleum Institute (IV-D-114), p. 128)**

**RESPONSE:** As described in the preamble, the gasoline sulfur standard was not set arbitrarily, but was set at 30 ppm to enable Tier 2 vehicle aftertreatment devices so the automobile manufacturers can meet the more stringent Tier 2 standards. Studies of the effect of sulfur on vehicle emissions show clearly that emissions increase with sulfur levels even modestly above 30 ppm.

In the response to comment B.2, we provide our analysis of the volume loss to the gasoline supply caused by this program, which is minor relative to the volume of gasoline produced. Thus, the process of desulfurizing gasoline is not expected to cause a supply problem that will result in price spikes. There is always the possibility that problems with starting up new equipment may cause disruptions in the gasoline supply, however, with the phase-in of the gasoline sulfur program, we believe that the startup of desulfurization units will be staggered sufficiently to minimize these effects. Due to the cost of desulfurizing gasoline, we expect the price of gasoline will increase somewhat, perhaps 2 cents per gallon, but the increase will probably not be discernable to the average consumer relative to the usual cyclical change in gasoline prices.

**COMMENT B.4:** The U.S. refining industry does not currently have in place sufficient capacity to significantly increase gasoline production to meet 2004 requirements. Crude distillation and downstream gasoline production facilities have been operating at near maximum levels. In 1998 crude distillation, catalytic cracking, and hydrocracking utilizations were 95.4, 91.4, and 81.6 percent, respectively. Rates were even higher during peak summer production periods. To just maintain historic share of U.S. gasoline supplies, U.S. refineries will have to expand major processing facilities by an amount equivalent to the following process additions: crude distillation, 1,505 MB/D; catalytic cracking, 546 MB/D; and hydrocracking, 135 MB/D. **(American Petroleum Institute (IV-D-114), p. 127, National Petrochemical and Refiners Association (IV-D-118), p. 69-70)**

**RESPONSE:** We believe that a high demand for refined product, which has put the industry at the limits of its capacity to meet that demand, does not indicate that the refining industry is at risk at being able to meet this programs' requirements. The oil industry has typically expanded its operations to meet increasing demand. An analysis of the crude oil throughput capacity completed by Fluor Daniel revealed that from 1991 - 1995, crude oil processing capacity increased by about 3 ½ percent. From 1995 - 1999, crude oil processing capacity increased by over 6 percent. Furthermore, this expansion occurred when the refining industry was experiencing several years of poor refining margins. As laid out in the response to Comment B.2, above, we anticipate the loss in gasoline volume to be only 20 million barrels per day, which is less than one forth of one years increase in the domestic industry's gasoline production. Since this loss will accumulate over the entire phase-in period, the impact is even less. Thus, this program's impact on the producibility of gasoline is expected to be insignificant, and the industry should enjoy the expected increased demand on its products.

**COMMENT B.5:** NPRA estimates that a 300 ppm standard will result in a loss on the order of 500 MB/d of potential gasoline supplies. This represents about 5.6 percent of projected 2004 gasoline demand, which will effectively increase incremental gasoline supply requirements for 2004 from 8.9 percent above 1998 volume to 15 percent over base 1998. The U.S. refining industry has not been required to expand gasoline demand at this pace in decades, even under more favorable industry economics and less stringent quality specifications. The loss of supply is a combination of US refining losses and possible reductions in available imports (provides an analysis of potential reductions from Canada, Venezuela, and Western Europe imports). **(American Petroleum Institute (IV-D-114), p. 128-129, National Petrochemical and Refiners Association (IV-D-118), p. 71-74)**

**RESPONSE:** See the responses to the above three comments on this issue. One reason why NPRA may have concluded that there will be a large loss in gasoline volume because it modeled gasoline desulfurization in PADD 4 using only Octgain 125 which can cause a loss of FCC gasoline volume up to 9 percent in the FCC naphtha. However, over the whole gasoline pool, that volume loss only translates to about three percent loss. Of all the desulfurization technologies, Octgain 125 probably causes the highest loss in gasoline volume (an advantage of this process is there is no loss in octane), so with the use of other desulfurization technologies, this volume loss would be expected to be much less. Our estimate of volume loss, which is based on the use of 7 different desulfurization technologies, is an order of magnitude less than that of Octgain by itself.

Our analysis of the supply of gasoline imports is inconclusive. The implementation of the gasoline sulfur program in Canada could cause a loss in gasoline volume there, with a commensurate decrease in exports to the U.S., because of the yield loss from the use of gasoline desulfurization technologies. However, the situation in Europe would likely be different. European refiners' focus is on diesel production and the impending desulfurization program there will likely cause some cracking of diesel blendstocks out of the diesel pool into the gasoline pool. The growth in gasoline pool from downgraded diesel will likely be greater than the loss of gasoline pool from desulfurizing gasoline because of the relative difference in volume between the two pools. For countries without gasoline sulfur programs, refiners there may find the gasoline sulfur requirement an obstacle to some of their gasoline which is higher in sulfur, however, those refineries would likely find a sufficient volume of low sulfur gasoline to maintain their current level of exports to the U.S., thus, the imports from those countries would either remain the same or decrease.

**COMMENT B.6:** EPA needs to consider the yield losses associated with sulfur controls. Refiners will have to increase production by 500,000 to over 1,000,000 B/D, depending on the extent of yield losses. **(Flying J, Inc. (IV-D-151), p. 3)**

**RESPONSE:** See the responses to the above four comments on this issue.

**COMMENT C:** Several commenters suggest that the California and international low sulfur programs are not models for a U.S. low sulfur program. Neither California nor Japan developed their low sulfur capability in a refining environment such as that in the U.S. The NPRA survey reveals that due to the availability of a substantial hydroprocessing capacity (for processing their crude slate and producing the required substantial mix) California refineries have a greater portion of lower sulfur gasoline than the rest of the U.S. In addition, unlike the East Coast, California does not rely on refined petroleum product imports; California has been a self-sufficient market for petroleum products for decades. Finally, geographical and market isolation protect California from outside suppliers. Japan's situation is unique. Because it is 100 percent dependent on imported crude oil, it made a decision to configure its refineries for high sulfur feedstocks to maximize crude purchase options and minimize crude oil costs. Very low sulfur gasoline programs in other

countries should not be viewed as justification for a similar program in the U.S. The U.S. refining industry has different refinery configurations, crude oil and product slates, and modification costs. The U.S. also uses heavier, more sour crudes than most other countries. California refineries are generally equipped with high pressure hydrotreating units that process FCC feed because of the trace elements (such as nitrogen and heavy metals) in the poor quality California crude. Thus, even before low sulfur requirements, California refineries averaged 150 ppm or below. Also, most of the California gasoline must meet federal RFG requirements (and stringent stationary source SO<sub>x</sub> emission requirements) and thus contain mandatory oxygenates. Therefore, it has been possible to hydrotreat FCC gasoline with minimum concern about octane levels given the use of MBTE. For Japan, the refining complex is more driven by diesel production than gasoline and thus Japan has more hydrocracking capacity and less FCC than the U.S. Also, the FCC capacity in Japan is usually associated with high severity hydrotreating to control stationary source SO<sub>x</sub>. **(American Petroleum Institute (IV-D-114), p. 18, Flying J Inc. (IV-D-151), p. 1-2, Marathon Ashland Petroleum LLC (IV-D-81), p. 7, National Petrochemical and Refiners Association (IV-D-118), p. 20-24)**

**RESPONSE:** A primary purpose of referring to the success of the current desulfurization programs in California and Japan is to provide evidence that there are refiners who have desulfurized their gasoline to low levels and are doing so on a day-to-day basis. These examples provide clear and simple evidence that desulfurizing gasoline is feasible, that there is a way to get there. When estimating the cost of desulfurizing gasoline we don't use those programs as models since what they are trying to achieve, as pointed out in these comments, may not be consistent with what the rest of the U.S. refining industry would have to do to meet a low sulfur gasoline standard. For example, California needs to lower olefins in addition to sulfur, so a conventional fixed bed desulfurization unit for treating the entire FCC naphtha may be appropriate for them, but probably not for a refiner producing gasoline for sale outside of California since olefin reduction equates to lost octane and this would likely be undesirable. Thus, conceptually, we think the rest of the refining industry can desulfurize gasoline cheaper than California refiners.

**COMMENT D:** EPA should fully examine the implications associated with estimating the cost of the gasoline sulfur proposal based on unproven technologies. For example, it has not been clearly demonstrated that new process technology such as CD Tech, Mobil OCTGAIN, Exxon, and Black and Veatch IRVAD Process are capable of operating consistently at 90 plus percent removal of sulfur. To provide 30-ppm gasoline, these processes must operate consistently and for long periods of time (i.e., 3-4 years) at this level. **(Flying J Inc. (IV-D-151), p. 3, Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Thomas Questions, p. 2)**

**RESPONSE:** Most refiners we spoke to on this issue said that they would feel comfortable if a particular technology they were interested in had about two years of successful in-refinery demonstrated service. We know that Mobil Octgain 100 and 125 and Exxon Scanfining already have been demonstrated for about two years. Since Octgain 220 is in service starting in March '99, that process will have been demonstrated for two years in the Spring of 2001. CDTech's CDHydro process has already demonstrated over two years of continual service in more than one refinery, and it seems to be the more critical part of the two part CDTech desulfurization service since it preserves olefins and octane. The CDHDS column, or other part of the CDTech process, will be demonstrated starting in the Spring of 2000. We anticipate that the absorption processes will start to be demonstrated about one year later.

Since we heard this argument from a number of refiners, we modified our assumptions for the final rule to base a large portion of the early investments on proven technologies, and

then we presume that other technologies will be used more as they gain more pilot plant and then commercial experience. Since there is probably is a range of views on this, we presumed that a diverse selection of desulfurization technologies would be used each year. This reflects different needs and differences in tolerance for aspects of these technologies. However, with time, we believe the tendency will be to use the lower cost technologies.

**COMMENT E:** EPA should fully evaluate and disclose the estimated number of refineries that would close as a result of the gasoline sulfur proposal. **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Bennett Questions, p. 1)**

**RESPONSE:** As discussed in response to Comment F, below, we believe that the phase-in provisions, and the special provisions for small refiners, both of which have been expanded in the final rule, have addressed concerns related to the issue of refinery closures.

**COMMENT F:** EPA should fully analyze the impact of higher compliance costs in PADD IV associated with the 30 ppm standard and the potential problems that motorists may experience as a result. **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Bennett Questions, p. 2)**

**RESPONSE:** Because of their smaller size and relatively remote locations, PADD 4 refineries are expected to experience higher costs to desulfurize their gasoline than other refineries. However, the geographic phase-in provisions will allow PADD 4 refiners to invest in the lower cost adsorption desulfurization technologies. These technologies allow refiners to desulfurize gasoline at a significantly lower cost. As discussed in response to comment (G), we think that our PADD 4 provisions addresses concerns relative to the issue of refiner closures in PADD 4. PADD 4 motorists may notice a small increase in the price of their gasoline, but otherwise should not experience any other changes.

**COMMENT G:** EPA should evaluate whether the refining industry is capable of raising \$4.65 billion in capital in less than four years to meet the proposed gasoline sulfur rule. **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Inhofe Questions, p. 1-2)**

**RESPONSE:** We analyzed the amount and the timing of investments which will have to be made by refiners to meet the gasoline sulfur requirements. We estimate that approximately one half of the estimated \$4.6 billion which the domestic refining industry will have to invest will be for meeting the program's requirements in 2004. The other half is spread out over the next 4 years. The projected aggregate amount and timing of investment for this program is similar to how investment was made by the refining industry in the early 90's to implement the Clean Air Act requirements, and money has devalued somewhat since then due to inflation.

**COMMENT H:** The compliance costs for refiners would not be too high. AIAM and AAM commissioned a study by MathPro which found that even the smallest refineries in PADD 4 should have no problems achieving the proposed program without economic harm. **(Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 5)**

**RESPONSE:** The automobile industry funded a study to determine if PADD 4 refineries are at risk of closing as a result of the proposed gasoline sulfur program. We generally agree with the automobile industry's comment that PADD 4 refineries will "achieve the proposed



program without economic harm," meaning that PADD 4 refineries will not close.

**COMMENT I:** Commenter argues that EPA needs to evaluate further the potential for refinery closures and the corresponding price and supply impacts, based on CA experience and independent study performed in Canada. CA has seen wide price fluctuations and supply problems since adoption of the 30/80 ppm low sulfur requirements. In addition, the small refiners in CA have basically stopped producing gasoline even though six of those refineries were operating when the ultra low sulfur requirements began. In addition, an independent analysis of refinery impacts in Canada associated with a potential Canadian ultra low sulfur regulation documented that 3 to 4 of Canada's 17 refineries might close as a result of that requirement. Thus, EPA's finding that no U.S. refineries would close under similar circumstances seems unfounded, and further analysis is needed. **(Sinclair Oil Corp. (IV-D-150), Ex. 1, p. 6-7; Ex. 2, p. 5-6)**

**RESPONSE:** The implementation of the Phase II Clean Fuels program in California which involves reductions in sulfur, aromatics, olefins, RVP and increased E300 must be considered a very different case from the implementation of a low sulfur program for the rest of the country. Clearly, the cost of meeting the California requirements are much higher because of the number of changes which refiners must make to gasoline. It is the high cost of meeting this program that forced some small refiners to stop producing gasoline. Since California implemented its Clean Gasoline program, new gasoline desulfurization technologies have been developed and are either being demonstrated now or will be demonstrated over the next several years. These new technologies, coupled with giving the small refiners and all the refiners in PADD 4 more time to choose among the lowest cost desulfurization technologies, will allow those refiners to desulfurize their gasoline at a much lower cost. For this reason, we think our provisions will provide small refineries the time necessary to evaluate the most advanced and low cost technology, as well as find sources for their funding. Conversely, Canada's refinery closure analysis did not consider that their refiners would use any of the more recently developed desulfurizing technologies. We believe that the conclusion by the Canadian Government would have been different if their refinery modeling study would have presumed that Canadian refineries could use these lower cost desulfurization technologies.

**COMMENT J:** EPA should ensure that the implications of the gasoline sulfur proposal on petroleum supplies as well as the impacts of international gasoline sulfur programs on domestic petroleum supplies are fully considered. Recent CA experience with severe price swings demonstrates the kind of supply interruptions and price fluctuations that could result from a national reduced sulfur program. **(National Petrochemical and Refiners Association (IV-D-118), p. 77-78, Senate Comm. Materials (IV-D-229), Sen. Inhofe p. 3, Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Thomas Questions, p. 2)**

**RESPONSE:** This comment is addressed in the response to Comment A.3, above, also, a few other notes are made here as well. The yield loss will cause a number of possible outcomes. Either the domestic refining industry will make up the gasoline volume loss, or the loss will be made up by imports. There may be a small increase in the price of gasoline, initially, which would initiate these adjustments, however, the price of gasoline will stabilize and the demand will be met. Our analysis of the supply of gasoline imports is inconclusive. The implementation of the gasoline sulfur program in Canada could cause a loss in gasoline volume there, with a commensurate decrease in exports to the U.S., because of the yield loss from the use of gasoline desulfurization technologies. However, the situation in Europe would likely be different. European refiners' focus is on diesel

production and the impending desulfurization program there will likely cause some cracking of diesel blendstocks out of the diesel pool into the gasoline pool. The growth in gasoline pool from downgraded diesel will likely be greater than the loss of gasoline pool from desulfurizing gasoline because of the relative difference in volume between the two pools. For countries without gasoline sulfur programs, such as Venezuela, refiners there may find the gasoline sulfur requirement a difficult obstacle to overcome and imports could decrease.

**COMMENT K:** EPA offers no justification for why it is reasonable for refiners to spend up to 2/3 of their annual capital expenditures on environmental controls (i.e., \$1.5 billion for this proposal plus existing \$1-2 billion for other programs). (**Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 30**)

**RESPONSE:** The most fundamental justification is contained in the air quality section of the Regulatory Impact Analysis. Also, we do not believe that environmental expenditures should comprise or be limited to a fixed amount of capital investment by an industry. Larger environmental gains justify a more significant investment (up to a point, which is addressed below). Also, each industry has its own unique set of investment requirements based on the rate of technology development, increase in sales volume, etc. The domestic refining industry is expanding capacity at a very slow rate. Existing equipment is also not being replaced rapidly due to advancing technology. Thus, overall investment is low relative to other industries. At the same time, the combustion of liquid fuels (including gasoline and diesel fuel) is one of the largest sources of pollution in the nation. It is, thus, not surprising that investment in environmental programs might represent a significant fraction of total investment. Only when investments exceed an industry's ability to pay can a program become overly burdensome. However, we project the industry's investment for this program to be similar to, or less than, the investments made in the early '90s to implement the Clean Air Act amendments. Taking into account the devaluation of the dollar, these investments are probably less than those made in the early '90s.

### **Issue 23.2.3: Other Sulfur Control Cost Issues**

**COMMENT A:** The increases in gasoline costs would be too high, particularly for those on below-median incomes. **(American Farm Bureau Federation (IV-D-143), American Petroleum Institute (Philadelphia - Day 1) (IV-F-131), Senate Comm. Materials (IV-D-229), Sen. Inhofe p. 4; Marathon statement, p. 2)**

**RESPONSE:** See response above on cost. With respect to the issue of the increase in price affecting below-median incomes, we believe that there is not much impact. If the increase in price is similar to the estimated cost, then gasoline prices associated with desulfurized gasoline would be expected to increase by less than 2 cents per gallon. Fluctuations in the price of gasoline over time can vary widely, sometimes by as much as 15 cents per gallon. The large but normal fluctuations in gasoline prices dwarfs the small increase in price which is expected to occur as a result of refiners recovering their cost of desulfurizing gasoline. Furthermore, the increased in gasoline price due to lower sulfur is associated with a large environmental benefit which more than offsets the price increase, this is especially true for those with below-median incomes as many of them live where the air is most polluted.

**COMMENT B:** EPA's proposed schedule could be a serious obstacle to emerging desulfurization technology that may reduce the cost of lowering sulfur by as much as 50 percent. **(American Petroleum Institute (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** See the response made in response to Comment 23.2.1.A.6, above.

**COMMENT C:** A low- or near-zero sulfur level can be achieved at a modest cost. The estimated costs of sulfur control are reasonable and would most likely decline further as companies gain experience implementing and improving desulfurization technologies. Sulfur control will not significantly affect the consumer supply and consequent pricing of gasoline. California's experience with supply shortfalls and short term price spikes were not due simply to the control of sulfur levels. California refineries supply most of the state's fuel products, so occasional disruptions in production can have a large impact on the state's supplies, whereas the rest of the country, by contrast, is much more interconnected through pipelines and is closer to foreign production centers. In addition, if nationwide sulfur levels are imposed, other states could more readily meet any supply shortfalls in certain areas, which would help avoid potential price spikes. **(Alliance of Automobile Manufacturers (IV-F-76), Alliance of Automobile Manufacturers (IV-D-115), p. 124-125, Galik, D.S. (IV-F-79), Senate Hearing Materials (IV-D-228), DaimlerChrysler statement, p. 1, U.S. Public Interest Research Group (Atlanta) (IV-F-132))**

**RESPONSE:** With respect to desulfurizing gasoline to lower levels than the level which we finalized, the reader is directed to issue 14. We also believe that the costs expected to be incurred by the refining industry to meet the gasoline sulfur standards are reasonable, however, whether the cost of a particular program is low or high is less important than if the program is cost-effective. We address the California comments in response to comment 23.2.2 A 3, which essentially agrees with the commenter.

**COMMENT D:** The estimated cost of 2 cents per gallon is reasonable. A vast majority of the public would pay at least this amount to improve air quality. **(American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association of Georgia (IV-F-13), American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of Ohio (IV-F-65), Campaign on Auto Pollution (IV-F-44), Clean Air Council**

(IV-F-28), Cohen, David L. (IV-F-23), Evangelical Environmental Network (IV-F-22), Fletcher, Robert E. (Atlanta) (IV-F-132), Fund for Public Interest Research (Atlanta) (IV-F-132), GA House of Representatives (Atlanta) (IV-F-132), Group Against Smog and Pollution (IV-F-45), Gutierrez, R. (IV-D-55), Hester, Randy (Philadelphia - Day 1) (IV-F-131), Mason, P. (IV-F-70), Miller, C.R. (IV-F-63), Mountcastle, Brooks (Philadelphia - Day 2) (IV-F-131), NJ Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Oregonians for Clean Air (IV-D-202), Senate Comm. Materials (IV-D-229), Sen. Lieberman p. 2; Sen. Moynihan, p. 1-2, Sierra Club (IV-F-14), Sierra Club, Northeast Ohio Group (IV-F-103), Sierra Club, Ohio Chapter Energy Committee (IV-D-101), Sweeny, Shawn (Cleveland) (IV-F-134), Weaver, Heidi (Philadelphia - Day 1) (IV-F-131), White, Randall F. (IV-F-10), Wisconsin Transportation Builders Association (IV-D-185))

**RESPONSE:** If the price increase caused by an environmental program is low enough to be acceptable by the public, thus engendering the public's support, it is helpful for the success of the program. We agree with the commenters that this program achieves important air quality benefits and is cost-effective.

**COMMENT E:** The RIA overlooks the adverse impacts associated with the switch to lower-sulfur diesel in 1993. EPA should ensure that the costs of equipment problems associated with changes in fuel parameters (i.e. deterioration of o-rings on fuel pumps) are considered. Following the introduction of hydro-treated, low-sulfur fuel in 1993, there were a number of unanticipated equipment problems, the most common of which was the deterioration of o-rings on fuel pumps of pre-1990 engines. The problems were caused by a change in the chemical composition of the new fuel and/or improper quality controls at refineries. The low-sulfur fuel typically contains a lower percentage of aromatics, which caused aromatics to leach out of the o-rings, causing shrinking and cracking of the o-rings which enabled fuel to leak from the pump. This problem costs between \$100 and \$500 to fix. **(American Trucking Associations (IV-D-70), p. 4-5)**

**RESPONSE:** California requires refiners there to produce diesel fuel to meet a stringent aromatics standard. As the commenter acknowledges, it was the implementation of that standard which resulted in the dramatic reduction in aromatics that caused problems with certain elastomers used in diesel engines. This gasoline sulfur program only requires a reduction in gasoline sulfur level and low sulfur gasoline is already being used in cars in California and Japan. It also is encountered in much of the premium gasoline pool in the rest of the U.S. and, occasionally, batches of regular gasoline are low in sulfur from refineries which process low sulfur crude oils and/or they don't have FCC units. We believe that if low sulfur gasoline caused mechanical or driveability problems with motor vehicles, that it would have already been discovered. Also none of the desulfurization technologies which refiners for desulfurizing gasoline is anticipated to cause significant enough changes in gasoline's other qualities to cause such problems.

## **ISSUE 24: COST EFFECTIVENESS ANALYSIS**

### **Issue 24.1: Accuracy of Cost Effectiveness Analysis**

**COMMENT A:** The high cost of the gasoline sulfur program should not be justified based on the new 8-hr ozone and fine PM standard. **(Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Senate Comm. Materials (IV-D-229), Marathon statement p. 3)**

**RESPONSE:** As described in the Supplemental Notice of Proposed Rulemaking [64 FR 35112, June 30, 1999], we believe that our combined Tier 2/gasoline sulfur program is fully justifiable based on the current 1-hour ozone and PM<sub>10</sub> NAAQS. Our revised air quality modeling for the Final Rulemaking shows that there will still be a substantial need for further reductions in NO<sub>x</sub>, VOC, and PM from mobile sources in the coming decades in order to attain and maintain the 1-hour ozone and pre-existing PM<sub>10</sub> NAAQS.

**COMMENT A.1:** The cost of the proposed gasoline standards is more than triple the cost of the vehicle changes, 15 times more costly than EPA's NO<sub>x</sub> SIP call proposal for NO<sub>x</sub> reductions from utilities and 7 times more costly than I&M controls on existing cars. **(Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Senate Comm. Materials (IV-D-229), Marathon statement p. 3)**

**RESPONSE:** We have determined that 30 ppm sulfur is necessary in order to ensure that gasoline-powered light-duty vehicles and trucks can meet the Tier 2 standards using the next generation of catalyst technology. We did not attempt to set the specific level of vehicle and fuel standards in a way that established equatubility between their respective costs or cost-effectiveness, because we determined that the Tier 2 standards could only be met if gasoline sulfur was lowered to 30 ppm.

The cost to society of our gasoline sulfur standard is approximately twice that for the vehicle costs when the annual costs for both are averaged over a thirty year period beginning in 2004. On the other hand, for a given Tier 2 vehicle in the first few years of its life, the additional vehicle costs will be greater than the fuel costs. However, the cost of our gasoline sulfur standard cannot appropriately be compared to the vehicle costs as alternative means for achieving emission reductions. As described above, the Tier 2 standards cannot be met without low sulfur gasoline. In other words, further improvements in vehicle design, without accompanying sulfur control, would not lead to emissions control that is as effective, or as cost-effective, as the final Tier 2 program, because the emission reductions would be greatly diminished compared to the Tier 2 program. In addition, comparing the costs of our Tier 2/gasoline sulfur program to costs for other programs is incomplete if the emission reductions associated with those costs are not also taken into account. This is the reason that we calculated cost-effectiveness, comparing costs incurred to tons reduced, and made comparisons between these \$/ton values for our Tier 2/gasoline sulfur program and \$/ton values for other programs. Using this approach, we have concluded that our Tier 2/gasoline sulfur program is a cost-effective means for reducing emissions from light-duty vehicles in comparison to other control strategies.

**COMMENT B:** Cost effectiveness evaluations should not be based on new and unproven desulfurization technology. **(American Petroleum Institute (IV-D-114), p. 91-92, Conoco, Inc. (IV-F-120), Murphy Oil USA, Inc. (IV-D-117), p. 2)**

**RESPONSE:** We based our cost-effectiveness analysis on the technologies expected to be

used to meet our standards. In doing so, we are not obligated to base our analysis only on technologies used in the past. Instead, we can base that analysis on technologies reasonably expected to be used in the future to meet our standards. This approach is technology forcing, and is the primary means through which advances are made in emissions control. In the case of refinery technologies for reducing gasoline sulfur, the refinery technology to achieve average sulfur levels of 30 ppm is currently available. We believe that this conventional technology will only be used by a small number of refiners to meet our 30 ppm standard, given the availability of advanced technologies which are currently being developed. These advanced technologies have already been demonstrated in pilot plants. In addition, the Octgain 220 system is already being used, and the CDTech process is expected to be operating by early in 2000. Therefore, it is reasonable for EPA to base its cost-effectiveness analysis on a range of desulfurization technologies, including conventional technologies and more advanced technologies, based on the expected timing of refiners' installation of equipment to meet the sulfur standards. See also response to comment 23.2.1.A.6.

**COMMENT C:** Cost effectiveness of the technologies for addressing vehicle emissions and the reductions in commercial gasoline is within the range of other available control strategies. **(National Park Service (IV-F-121))**

**RESPONSE:** We agree with this comment.

**COMMENT D:** It is likely to be more cost effective to develop an "off-the-vehicle" technology that reverses sulfur's effects on catalytic converters than to replace damaged converters or implement an expensive sulfur standard in regions that do not need it. **(Wyoming Refining Company (IV-F-127))**

**RESPONSE:** We do not believe that periodic removal of the catalyst from the vehicle in order to purge accumulated sulfur from its surface is a viable alternative to our low sulfur gasoline program. First, removal of the catalyst from a vehicle and its reconnection is a time-consuming process that could not be completed in the timeframe of a typical oil change. And if not completed during a regular oil change, it would be necessary for drivers to make regular visits to a mechanic just for this purpose. The inconvenience of these additional, regular visits would certainly result in a low rate of participation. Secondly, such a periodic purging process would provide essentially no emissions benefit from the catalyst, since sulfur poisoning occurs after only a single refueling, and there can easily be 10-20 refuelings between oil changes.

**COMMENT E:** The CAA requires EPA to consider diesel fuel quality in evaluating the cost-effectiveness of diesel vehicles meeting the vehicle emission standards proposed in the Tier 2 rulemaking. EPA's failure to perform an independent analysis of this factor for diesel-powered vehicles is inconsistent with Section 202(i) of the CAA. EPA proposed the Tier 2 NO<sub>x</sub> and PM standards for diesel-powered vehicles based solely on feasibility and cost-effectiveness studies of those standards for gasoline vehicles. (see digest for 26.1.2(R)) **(Alliance of Automobile Manufacturers (IV-D-115), p. 13-18, Engine Manufacturers Association (IV-D-71), p. 29, Marathon Ashland Petroleum LLC (IV-D-81), p. 25, U.S. Chamber of Commerce (IV-D-142), p. 5-7)**

**RESPONSE:** Section 202(i) of the Clean Air Act does not require an independent cost-effectiveness analysis of our Tier 2 standards for gasoline and diesel. Indeed, the pending emission standards for light-duty vehicles and trucks given in Table 3 of Section 202(i) imply that gasoline and diesel-powered vehicles will meet the same standards. Currently, diesel-powered vehicles comprise an extremely small portion of the fleet, and their

inclusion in our cost-effectiveness analysis would not substantively affect the final cost-effectiveness values. Thus we conducted our cost-effectiveness analysis only for gasoline-powered vehicles and trucks. See also responses to comments under Issue 2.3.1.

**COMMENT F:** EPA's analysis compares the cost-effectiveness of vehicle controls along with that of fuel controls after vehicle controls are imposed. EPA should compare vehicle controls alone versus fuel controls alone, which would accurately show that fuel controls are much more cost-effective. GM cites to a study by AIR that shows the near-term cost effectiveness of sulfur controls were far greater than that of the vehicle controls. This analysis also demonstrates that EPA's cost-effectiveness findings are entirely the result of EPA's arbitrary choice to assign the last and most expensive reductions to the fuel component of the combined program. EPA should assume that fuels regulations are implemented first under section 211(c)(1). A similar flaw exists in the study by the Mercatus Center at George Mason University, dated 7/23/99, which compared the cost-effectiveness of vehicle controls alone to the cost-effectiveness of fuel controls assuming vehicle controls are already in place. **(General Motors Corporation (IV-D-209), vol. 1, p. 3; vol. 3, p. 21-22)**

**RESPONSE:** Our cost-effectiveness analysis did not include an evaluation of the Tier 2 vehicle program absent the gasoline sulfur program, because we determined that the Tier 2 standards could only be met if gasoline sulfur was lowered to 30 ppm. Instead, our per-vehicle cost-effectiveness analysis included the entire vehicle/fuel program, comparing the emissions of a Tier 2 vehicle operating on 30 ppm gasoline to an NLEV vehicle operating on current (approximately 300 ppm) gasoline. However, we have conducted an evaluation of alternative fuel program options as discussed in the response to comment 24.2.E, and it shows that they are less cost-effective than the program we are adopting and do not achieve the same emission reductions.

EPA disagrees with the commenter's assertion that the Agency should assume fuel controls are implemented first under Section 211(c)(1). Section 211(c)(2)(A) provides that, prior to adopting a fuel control or prohibition, EPA shall consider other technologically or economically feasible means of achieving emissions standards under Section 202 of the Act. This provision has been interpreted as requiring consideration of establishing emissions standards under § 202 prior to establishing controls or prohibitions on fuels or fuel additives under § 211(c)(1)(A). See *Ethyl Corp. v. EPA*, 541 F.2d. 1, 31-32 (D.C. Cir. 1976). Thus, it is not inconsistent with Section 211(c) for EPA to analyze the overall cost effectiveness of the vehicle and fuel standards, in light of our conclusion that both sets of standards are necessary in order to achieve the emission reductions that are needed.

**COMMENT G:** EPA cannot use a per vehicle analysis on a phased in program. The fact that new Tier 2 vehicle sales will take 14 years to replace the current fleet is not addressed. At the end of the first year, only 7 percent of the fleet will meet Tier 2 standards, while all of the gasoline will have to meet the required standards. A per vehicle analysis may be satisfactory for a vehicle cost-effectiveness analysis, but when doing an analysis of a fuel and vehicle program, the temporal aspects of the fleet changes and the annual emission benefit changes must be included in the analysis. In fact, in the first 14 years of the Tier 2 program the discounted benefits will be only 45 percent of the discounted benefits EPA has claimed. **(American Petroleum Institute (IV-D-114), p. 92, Marathon Ashland Petroleum LLC (IV-D-81), p. 28)**

**RESPONSE:** A per vehicle approach to cost-effectiveness is intended to show what the cost-effectiveness of the program will be for a Tier 2 vehicle running on low sulfur gasoline. This approach focuses on the intended goal: the combined effect of low sulfur on Tier 2

vehicles. It is not the primary goal of the program to produce emission reductions from the use of low sulfur gasoline on existing vehicles, though these existing-fleet emission reductions are real.

Our approach to cost-effectiveness is consistent with the approach that has been taken for many past EPA rules. However, since it is true that the gasoline sulfur program will be fully implemented long before the fleet turns over, we have conducted an alternative cost-effectiveness analysis in which the net present value of total annual costs and emission reductions are summed over 30 years. The results of this "aggregate" cost-effectiveness analysis have been included in the final rule. Our aggregate analysis also shows that our Tier 2/gasoline sulfur program is cost-effective.

**COMMENTS H and I:** Emission reductions in non-transport attainment areas have no value. EPA appears to have given equal weighting in its analysis to benefits in the ozone attainment areas as was given to the nonattainment areas. The validity of this practice is questionable. Since by definition the NAAQS levels are set at a point to protect public health with an adequate margin of safety, EPA cannot claim additional public health benefits for ozone and PM reductions in attainment areas. Moreover, such an analysis clearly runs counter to section 211(c), which limits EPA's authority to regulate fuels to situations where emissions cause or contribute to air pollution which may reasonably be anticipated to endanger the public health or welfare, or where emissions significantly impair the performance of pollution control devices. Therefore, emission reductions in non-transport attainment areas cannot be credited in justifying the Tier 2 rule or in the cost effectiveness or cost-benefit analyses, and transport areas should be credited in accord with some reduced factor that is based on analysis such as that provided in the OTAG study. Other commenters raise similar arguments.

Similarly, winter NO<sub>x</sub> and NMHC reductions do not reduce ozone exceedances. Winter NO<sub>x</sub> and NMHC reductions cannot be credited toward attainment of the ozone NAAQS. Ozone is a summer problem. Ozone exceedances, the only time when people can be exposed to ozone levels above the NAAQS, occur only in periods of warm/hot weather. The CAA recognized these points by limiting VOC and NO<sub>x</sub> reductions to the "high ozone season" and EPA endorsed the concept in establishing the VOC control season for RFG. Therefore, only NO<sub>x</sub> and NMHC reductions during the VOC control season can reduce ozone exceedances, and only these reductions can be credited in a cost effectiveness analysis. This correction should reduce the NO<sub>x</sub> and NMHC tons claimed by EPA by about two-thirds.

**(American Petroleum Institute (IV-D-114), p. 92-93, Koch Petroleum Group, LP (IV-D-72), p. 40, Marathon Ashland Petroleum LLC (IV-D-81), p. 28-29)**

**RESPONSE:** Cost-effectiveness only has relevance when compared to alternative strategies. Thus we must use an approach to calculating the cost-effectiveness of our annual, nationwide program that is consistent with the approaches taken for calculating the cost-effectiveness of various alternative strategies. For programs that generate emission reductions outside of nonattainment areas or during the winter, we generally include those reductions in the cost-effectiveness calculations without any sort of discounting. To exclude such emission reductions from our cost-effectiveness analysis would yield an invalid comparison with other strategies for attaining and maintaining the NAAQS. In addition, even if the cost-effectiveness analysis for our combined Tier 2/gasoline sulfur program accounted only for emission reductions in attainment areas and during the summer, this change would also need to be made in the cost-effectiveness analyses from other programs to produce a valid comparison. And in this case, our conclusion that our Tier 2/gasoline sulfur program is cost-effective would not change.



As described in the final rulemaking, we have determined that our combined Tier 2/gasoline sulfur program must be year-round and nationwide in scope. The catalysts that we expect to be used on Tier 2 vehicles could be permanently poisoned after exposure to high sulfur gasoline. Such exposure would happen quickly if the low sulfur program applied to only one region of the country or only to the summer season.

Beyond the fact that we are maintaining consistency with the approach to cost-effectiveness used for other programs, we believe that VOC and NOX emission reductions have benefits other than reducing ozone levels in nonattainment areas. These include reductions in air toxics, reductions in primary and secondary fine PM, reductions in CO, and reductions in damage to agricultural crops, forests, and ecosystems from ozone exposure. In addition, there are ozone health benefits to be gained in attainment areas, since there is no apparent threshold for biological responses to ozone exposure. Emission reductions in attainment areas also help to maintain clean air as the economy grows and new pollution sources come into existence. For these reasons we believe it is appropriate to include all emission reductions produced by our program in our cost-effectiveness analysis.

**COMMENT J:** The SO<sub>x</sub> credit should be decreased to a value in the \$300-400 per ton range based on actual experience for sale of such credits (e.g., California). **(American Petroleum Institute (IV-D-114), p. 93)**

**RESPONSE:** The primary utility of a cost-effectiveness analysis is in determining if the control strategy under consideration represents an appropriate next step in efforts to reduce pollution compared to alternatives. With this in mind, comparisons to potential future strategies are actually more useful than comparisons to past strategies, since it is the potential future strategies that represent alternatives to the strategy under consideration. It is true that the cost-effectiveness of past strategies will generally be more accurate calculations of the cost-effectiveness of those strategies, compared to the accuracy of estimates of the cost-effectiveness of future strategies. However, every new emission control program is likely to be more costly than previous programs, so comparisons to past programs can be misleading.

We determine that, since our Tier 2/gasoline sulfur program does produce incidental reductions in SO<sub>2</sub> and direct sulfate PM emissions, it is appropriate to account for those reductions in our cost-effectiveness analysis. The value of a ton of SO<sub>2</sub> or a ton of PM should be determined by the cost of reducing a ton of either pollutant using a strategy other than Tier 2/gasoline sulfur. In other words, the most appropriate source of information on the value of SO<sub>2</sub> and PM is the cost-effectiveness for reducing emissions of these pollutants using potential future strategies, the only true alternatives to Tier 2/gasoline sulfur. It was from a compilation of potential future strategies that we estimated the value of SO<sub>2</sub> at \$4800/ton and PM at \$10,000/ton.

**COMMENT K:** The \$10,000/ton of PM assumption should be corrected to rid the influence of PM<sub>2.5</sub> on this assumed value. It appears that \$2,400 should be assumed, given the recent court ruling in ATA v. EPA. **(American Petroleum Institute (IV-D-114), p. 93)**

**RESPONSE:** The particulate matter that would be reduced as a result of our Tier 2/gasoline sulfur program could be categorized as fine PM having mean particle diameters of less than 2.5 microns. Since PM<sub>2.5</sub> is generally considered to be of greater concern to health than PM<sub>10</sub>, it is appropriate to value the Tier 2 reductions based upon the cost of future PM<sub>2.5</sub> control. The fact that the revised NAAQS for PM was remanded does not change this situation. In fact, the ATA vs. EPA case did not question the science behind

the PM<sub>2.5</sub> standard. Thus it is appropriate to assign a value to the particulate matter reduced from our Tier 2/gasoline sulfur program that is based on alternative strategies for controlling PM<sub>2.5</sub>. It is also important to note that, as stated in the NPRM and final rulemaking, \$10,000/ton is also the low end of the range of PM control from the recently promulgated urban bus standards, and thus represents a conservative but reasonable value for crediting PM for our Tier 2/gasoline sulfur rule.

**COMMENT L:** EPA should reanalyze the incremental cost effectiveness of alternative proposals which meet the \$10,000/ton metric and revise the Tier 2 proposal accordingly. **(American Petroleum Institute (IV-D-114), p. 94-95, Marathon Ashland Petroleum LLC (IV-D-81), p. 29-30, National Petrochemical and Refiners Association (IV-D-118), p. 2, 15)**

**RESPONSE:** The \$10,000/ton metric (discussed in the President's Memorandum to EPA Administrator Carol Browner on Implementing of Revised Air Quality Standards for Ozone and PM, July 16, 1997) was used as a maximum value in the air quality modeling conducted for the rulemaking to revise the ozone and PM NAAQS. Only those programs costing less than \$10,000/ton were actually modeled in that rulemaking. Using this limitation, most, but not all, nonattainment areas came into attainment. It might be surmised, then, that programs costing more than \$10,000/ton would need to be implemented for all areas to reach attainment.

As stated in our final rule for Tier 2/gasoline sulfur, there are no absolute values for cost-effectiveness that would indicate when a given program is or is not cost-effective. Cost-effectiveness is only a relative measure, having relevance only when the \$/ton value for one program is compared to the \$/ton value for an alternative program. The limit of \$10,000/ton used in the NAAQS revisions rule is not an Agency benchmark applicable to all new control strategies, but instead was used only to determine which control strategies among the myriad of possibilities would most likely be implemented.

**COMMENT L.1:** EPA states "Incremental cost-effectiveness will produce different \$/ton values than an average approach to cost-effectiveness only if the costs or emissions are nonlinear." API agrees with this statement. However, EPA goes on to state "In the case of our proposed standards, both the emissions reductions and the fuel costs are nearly linear, though the vehicle costs do contain some nonlinearity." No mention is made of potential nonlinearity with regard to fuel costs as a function of desulfurization. EPA has completely side-stepped the issue of what might be justified if the analysis were performed on a more appropriate incremental basis. Neither the average cost-effectiveness of the total program nor the incremental cost-effectiveness of the fuels change comes close to EPA's cost-effectiveness metric of \$10,000/ton. The fuel cost-effectiveness is around \$100,000/ton on a per vehicle basis. Even the incremental cost-effectiveness of the vehicle changes is slightly above this metric, at about \$18,000 near term and under \$14,000/ton long term on a per vehicle basis. In contrast, the average cost-effectiveness on a per vehicle basis of the oil industry fuel proposal is about \$30,000/ton. NPRA similarly argues that EPA's own data show a sharp, nonlinear increase in the cost curve at lower sulfur levels. **(American Petroleum Institute (IV-D-114), p. 94-95, Marathon Ashland Petroleum LLC (IV-D-81), p. 29-30, National Petrochemical and Refiners Association (IV-D-118), p. 2, 15)**

**RESPONSE:** We do not believe that an incremental approach to cost-effectiveness is more appropriate than an average approach. As described in the NPRM, nearly all other previous control programs made use of an average approach to cost-effectiveness. It would be misleading to compare the incremental costs of NOX and VOC control under our Tier 2/gasoline sulfur program to the average costs of other programs. In addition, data on incremental costs and emission reductions for other programs are difficult to

procure.

However, as described in our NPRM and agreed to be the commenters, it is nonlinearities in costs and emission reductions that cause incremental and average approaches to cost-effectiveness to differ. According to our analyses of gasoline desulfurization, the nationwide costs are largely linear from the current average of about 300 ppm down to our standard of 30 ppm. For these reasons, we are continuing to use an average approach to cost-effectiveness in our final rule.

The cost-effectiveness estimates presented by the commenter inappropriately exclude emission reductions in attainment areas and outside of the ozone season. They are also presented separately for the fuel and vehicle, an approach which we believe is inappropriate for our combined program.

Using our average, per-vehicle approach to cost-effectiveness in which all nationwide, annual emission reductions are properly counted, the cost-effectiveness of our program falls far below \$10,000/ton. Thus, regardless of whether \$10,000/ton is a proper benchmark, we believe our program to be an appropriate next step for controlling mobile-source NOX and VOC emissions.

**COMMENT M:** EPA has failed to perform a proper cost assessment in its RIA since it does not calculate cost effectiveness on the basis of ozone and PM concentrations. In the Tier 2 context, EPA must make a determination of costs incurred and their effectiveness in achieving the stated regulatory goals - attainment and maintenance of the ozone and PM NAAQS. Cost effectiveness should be assessed in terms of reduced ambient ozone or PM concentrations. EPA has calculated cost effectiveness only on the basis of reductions in an intermediate goal - i.e. reduction of NO<sub>x</sub> and NMHC emissions. In addition, EPA's analysis fails to include consideration of the cost-effectiveness of reductions in PM levels. The relation between precursor reductions and ambient levels is not linear and EPA should not be using precursor emissions as a proxy for evaluating the cost-effectiveness of achieving the ultimate goal. Another commenter adds that use of ambient ozone reductions rather than precursor emission reductions for calculating cost effectiveness is especially important to allow for comparing regional impacts (since attainment area ozone reductions have no value). **(General Motors Corporation (IV-D-209), vol. 3, p. 19-20, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 14-16)**

**RESPONSE:** We agree that the goal of our Tier 2/gasoline sulfur program is to contribute to all areas of the country to attaining and maintaining the ozone and PM NAAQS. Thus it may appear reasonable that cost-effectiveness reflect this goal, producing \$/ppb values that are based on either ozone or ambient PM concentrations instead of \$/ton values based on the precursors NOX, VOC, and SO<sub>2</sub>. However, there are several reasons why we have not taken this approach to cost-effectiveness for our Tier 2/gasoline sulfur program. First, as stated above, cost-effectiveness is only a relative measure, and therefore must be calculated using an approach equivalent to that used in other rulemakings in order to produce an apples-to-apples comparison. No other EPA programs have calculated cost-effectiveness on the basis of ozone or ambient PM concentrations, so no point of comparison exists. Furthermore, since the relationship between emissions and air quality is not always linear, no single value could be established as accurately representing our program.

Finally, an approach to cost-effectiveness in which ambient concentrations of ozone and PM are the focus would be intended to show the cost-effectiveness of our program in reducing the health problems associated with these pollutants. However, absent a cost-effectiveness analysis for other programs based on ambient concentrations, this analysis

does not allow for comparisons to other programs. Moreover, the goal of comparing economic costs to reductions in health problems is served by the cost-benefit analysis conducted for our program, where the costs of the program are compared to the monetary value of the health benefits produced. As a result, we believe it is unnecessary to conduct a cost-effectiveness analysis on the basis of ozone and ambient PM concentrations.

**COMMENT N:** EPA should perform a region-by-region cost-effectiveness analysis. Because Congress has explicitly directed EPA to consider alternative State-imposed controls, which by definition apply locally, EPA must determine whether the proposed Tier 2 standards are cost-effective on a regional basis. Based on available information, regional cost-effectiveness figures appear certain to undermine EPA's proposal, especially if they are properly stated in terms of changes in concentrations of the criteria pollutants rather than in terms of precursor emissions. **(General Motors Corporation (IV-D-209), vol. 3, p. 20, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 30)**

**RESPONSE:** We have determined that our Tier 2/gasoline sulfur program must be national in scope, with the same standards applying in every region of the country. It would be unreasonable to expect different vehicle or fuel standards to apply in different regions under our program, given concerns about catalyst irreversibility and the continual movement of vehicles in and out of individual regions. Thus a region-by-region cost-effectiveness analysis would not provide any additional information that could aid in determining the standards for a nationwide program. This is consistent with the approach taken in past Agency rulemakings: when a program is national in scope, the cost-effectiveness analysis is also national in scope.

However, in our discussion of cost-effectiveness we did make comparisons to potential future control strategies which would apply locally. On the basis of that comparison which was presented in both the proposed and final rules, our Tier 2/gasoline sulfur program is clearly a cost-effective option in comparison to regional approaches to producing further emission reductions.

**COMMENT O:** EPA's adjustment of the cost-effectiveness figures to account for benefits from its regulatory controls on PM and SO<sub>2</sub> formation underestimate the relative cost-effectiveness of vehicle and sulfur controls. EPA's adjustment of the cost-effectiveness figures to account for benefits from its regulatory controls on PM and SO<sub>2</sub> formation selectively conflates cost-benefit analysis with cost-effectiveness analysis. In addition to being confusing and contrary to its statutory mandate, EPA's cost-crediting approach distorts the relative cost-effectiveness of vehicle and sulfur controls. Under this approach "cost-credited" costs of vehicle controls are calculated based on those figures that implicitly assume that the sulfur program has already been adopted. EPA must compare the relative cost-effectiveness of vehicle controls alone with the relative cost-effectiveness of sulfur controls alone. **(General Motors Corporation (IV-D-209), vol. 3, p. 20-21)**

**RESPONSE:** We presented our cost-effectiveness estimates on two bases: credited and uncredited. The credited basis is an attempt to account for reductions in SO<sub>2</sub> and PM that are real and are produced as a direct result of our Tier 2/gasoline sulfur program. The uncredited basis presents cost-effectiveness values in the more limited \$/ton NO<sub>x</sub> + NMHC without any consideration of reductions in sulfur-containing compounds. Cost crediting has been used in past EPA rulemakings to account for benefits that are produced as a result of the program, but which were not the primary intention of the program. In addition, the inclusion of crediting in our cost-effectiveness analysis is not contrary to the mandate in the Clean Air Act for evaluating cost-effectiveness, since cost-effectiveness is

not specifically defined there. Thus we consider both the credited and uncredited bases to be valid for cost-effectiveness, and both were presented so that comparisons to other programs could be made on either basis.

We do not believe that our crediting approach mixes cost-effectiveness with cost-benefit analyses. Cost-benefit is concerned with impacts on human health and the environment. The crediting values that we used for SO<sub>2</sub> and PM, however, were based on the value of reducing a ton of each pollutant (in other words, cost-effectiveness) drawn from other programs.

There are no implications of SO<sub>2</sub> and PM crediting for the relative cost-effectiveness of vehicle and fuel controls, since vehicles and fuels were not evaluated separately in our cost-effectiveness analysis. As described above, we believe that the vehicle and fuel controls must be considered together (see responses to Comments 24.1.A.1 and 24.1.F.1).

**COMMENT P:** EPA should fully examine the impacts of increases in gasoline purchases on the U.S. economy in the context of the Tier 2 rulemaking. (**Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Thomas Questions, p. 2**)

**RESPONSE:** The increase in gasoline purchases of \$1.5 billion beginning in 2004 is equivalent to an increase in fuel costs associated with lower sulfur of less than 2 ¢/gal. As described in Section V.B.4 of the Regulatory Impact Analysis, the increase in fuel costs will be approximately \$12 in the first year of the program for the average vehicle owner who refuels with low sulfur gasoline. This represents only a few percent of the total fuel costs incurred by the average vehicle owner in a given year. In addition, gasoline fuel prices will often vary by at least this amount for other reasons: season to season variations, changes in taxes, and uncontrollable changes in crude oil prices. Therefore, we do not believe that an average increase of \$12 per year will be significant for most vehicle owners, and we do not believe it necessary to conduct an additional analysis of the impacts of this fuel cost increase on the U.S. economy.

**COMMENT Q:** The proposed rule is not cost effective if, as should be the case, the costs of the Tier 2 and low sulfur gasoline programs are divided into the benefits. Commenter provides additional rationale for this critique of EPA's cost-effectiveness analysis. (**Koch Petroleum Group, LP (IV-D-72), p. 39-40, 43**)

**RESPONSE:** Cost-effectiveness and cost-benefit analyses are two different approaches to determining whether our Tier 2/gasoline sulfur program is an appropriate next step for controlling NOX and VOC emissions from mobile sources. We are required by the Act to evaluate the cost-effectiveness of our program. We are not required to compare the costs to the monetized benefits, but have done so to show that our program will in fact produce benefits that exceed the costs. See responses to Issue 25: Benefit/Cost Analysis.

**COMMENT R:** The cost effectiveness of the proposed rule is out of line with other available controls. (**Koch Petroleum Group, LP (IV-D-72), p. 43**) (**See other letter listed under Comment R.1 that follows.**)

**RESPONSE:** In the detailed comments, commenter says that the fuel costs were underestimated due to our determination that desulfurization will occur largely through advanced refinery technologies. In fact we have made allowance for the use of conventional desulfurization technology in our fuel cost estimates for the final rule. See

response to Comments 24.1.B, 23.2.1.A and 23.2.1.B. Using the fuel costs presented in our final rulemaking, the cost-effectiveness of our Tier 2/gasoline sulfur is not out of line with other available controls.

**COMMENT R.1:** Commenter provides data that show that gasoline sulfur controls will be significantly more costly per ton of pollution removed than vehicle controls. Commenter suggests that more targeted approaches relying on regional, state, and local initiative may achieve ambient air standards in a more cost effective fashion. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 10-14, 35-36)**

**RESPONSE:** We believe that the fuel program and vehicle program should be considered together when evaluating cost-effectiveness, as described in the response to comment 24.1.F. We also believe that our program should apply nationwide. See Issue 13. However, we have conducted an evaluation of a selection of alternative fuel programs as described in the response to comment 24.2.E.

**COMMENT S:** EPA's analysis failed to look at reasonable alternatives such as higher sulfur levels, elimination of per gallon caps, regional approaches, use of family emission levels, targeted, non-regulatory approaches (e.g., warnings for at-risk individuals on high ozone days) or longer phase in dates. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 16-22, Senate Comm. Materials (IV-D-229), Sen. Inhofe p. 3-4)**

**RESPONSE:** The cost-effectiveness analysis presented in the draft Regulatory Impact Analysis did include values for alternative programs. However, cost-effectiveness was not and should not be the basis on which decisions are made regarding the appropriate sulfur level or the phase-in schedule. The sulfur level is dictated by the level needed to achieve the Tier 2 vehicle standards, and the phase-in schedule is dictated by a combination of when refiners will be able to produce the low sulfur fuel and when the vehicles will need it. See also response to Comments 23.2.2.B.1 and 26.2.M. EPA also notes that Section 211(c) of the Act does not require the Agency to evaluate the cost-effectiveness of all possible alternative programs, including different sulfur levels and different implementation schedules. See response to Comment 24.1.R. above.

We did conduct evaluations of the alternative approaches listed by the commenter. Our conclusions about these alternatives can be found in our responses to other comments. For higher sulfur levels, see responses to comments under Issue 14. For per gallon caps, see responses to Comment 14.P and Issue 15. For regional approaches, see responses to comments under Issue 13. For family emission levels, see responses to Comments 3.2.B, E, F, and I, as well as 3.3.G. For longer phase-ins, see responses to Comments 5.C and 16.C.

**COMMENT T:** Problems with EPA's cost-effectiveness analysis lead to a failure to meet the Section 202(i) requirements. The package of vehicle emission control technologies is too speculative and does not represent the actual mix of technologies that will be used. Also, the ultimate price of gasoline and diesel fuel will have a significant impact on which control technologies are used and that ultimate price is difficult to estimate at this time. **(U.S. Chamber of Commerce (IV-D-142), p. 4-5)**

**RESPONSE:** In developing our Tier 2/gasoline sulfur program, we did not engage in speculation on the technologies that will be used, but instead gathered information from aftertreatment and vehicle manufacturers on the most likely technologies. Our analysis of vehicle technologies shows that it is the evolution of current technology, rather than the

development of entirely new technologies, that will allow the Tier 2 standards to be met when combined with low sulfur gasoline.

We always project increases in the cost of fuels or vehicles that would result when we set new standards. These cost projections are used to determine exactly what standards to set and other elements of the new program. We do not make projections of increases in price, which represent the actual amount consumers would have to pay at the retail level, since price would be functions of future crude oil prices and other inestimable factors. However, it is unlikely that the future price of gasoline or diesel will have a large impact on the vehicle technologies that are actually used by manufacturers to meet our Tier 2 standards, since those technologies are designed in the years before they are actually used when price is still very difficult to estimate. We therefore believe that our cost estimates are an accurate means for setting the specific standards and for determining which technologies will most likely be used to meet those standards.

## **Issue 24.2: Other Cost Effectiveness Analysis Issues**

**COMMENT A:** The proposed low-sulfur program is cost-effective. (**American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Blackbrook Audubon Society (IV-F-104), California Air Resources Board (IV-D-271), p. 1, California Air Resources Board (IV-F-126), Clean Air Network, et. al. (IV-F-95), Department of Environmental Health, City and County of Denver (IV-F-62), Environmental Defense Fund (Denver) (IV-F-133), Michigan Environment Council (IV-F-105), National Park Service (IV-F-121), STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), State of Wisconsin (IV-D-166))** (See other letters listed under Comments A.1 through A.3 that follow.)

**RESPONSE:** We did not calculate the cost-effectiveness of the low sulfur program apart from the vehicle program, since we do not believe that the vehicle program and fuel program can be separated from one another. We would agree, however, that our combined Tier 2 vehicle/gasoline sulfur program is cost-effective.

**COMMENTS A.1-3:** Added per vehicle cost of \$200 to \$300 for both new technology and cleaner fuels over the life of the vehicle is reasonable. At approximately \$2,000 per ton of NO<sub>x</sub> + VOC removed, as estimated by EPA, these programs are at least as cost-effective as, if not more cost-effective than, most other control measures available to State and Local governments, and the dividends are huge. The costs of \$100/vehicle and 2¢/gallon are reasonable. (**American Lung Association (IV-D-167), p. 1, City of Fort Collins (IV-F-125), International Center for Technology Assessment (IV-D-122), p. 1, Physicians for Social Responsibility (IV-D-194), STAPPA/ALAPCO (IV-D-67), p. 2**)

**RESPONSE:** We agree with these comments.

**COMMENT B:** The proposed low-sulfur program is not cost-effective. Based on earlier analyses conducted by API, a 40 ppm average gasoline sulfur level coupled with the Tier 2 standards will cost \$23,000/ton, which is well above other emission controls. For example, less than \$250/ton for acid rain NO<sub>x</sub> control or less than \$2,000/ton on controls for utility NO<sub>x</sub> emissions. Another commenter states that EPA should not analyze the proposal solely on the basis of average cost effectiveness because that approach does not allow for comparison of alternatives or comparison of individual elements of the proposal. Commenter provides substantial analysis to buttress claim that the cost-per-ton of individual components of the proposal are significantly higher than the average EPA presents. (**American Petroleum Institute (Philadelphia - Day 1) (IV-F-131), Countrymark Cooperative, Inc. (IV-F-124), Frontier Oil (Denver) (IV-F-133), Murphy Oil USA, Inc. (IV-D-4), p. 2, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 10-14, App. 2)**)

**RESPONSE:** We believe that our cost-effectiveness analysis used the most appropriate set of assumptions, including our estimates of the costs of gasoline sulfur reduction, to allow an apples-to-apples comparison to other programs. The analysis conducted by API was based on assumptions that amplified the costs for sulfur reduction, such as assuming entirely conventional desulfurization technology. In addition, the API cost-effectiveness estimates did not include emission reductions outside of attainment areas and outside of the ozone season. We believe that such an approach does not permit a relevant comparison to the cost-effectiveness of other programs. See responses to Comments 24.1.I.1 and 24.1.J.1.



The commenter suggests that the individual elements of our rule should be evaluated separately. The program we are implementing is an integrated approach combining both vehicle and fuel controls for all passenger vehicles, designed to insure clean air for all Americans. Both its cost and effectiveness, therefore, need to be viewed from the perspective of the operation of the overall program. For this reason we focused on a cost-effectiveness evaluation which included both the fuel and vehicle programs together. However, we have evaluated a selection of other alternative programs. See responses to Comments 24.1.F and 24.2.E.

**COMMENT C:** [Reserved]

**COMMENT D:** A near-zero sulfur fuel can be achieved at a modest cost. **(Alliance of Automobile Manufacturers (Atlanta) (IV-F-132))**

**RESPONSE:** This comment has been addressed previously. See responses to Comments 14.E, 14.F, 23.2.3.C, and 24.2.E.

**COMMENT E:** Fuel controls are several times more cost-effective than controls on vehicles. Air Improvement Resource, Inc. (AIR) analyzed the cost-effectiveness of reducing fuel sulfur content to 5 ppm. In doing so, AIR attempted to bias the cost-effectiveness analysis to favor vehicle controls through the assumption that reducing fuel sulfur levels to 5 ppm would cost fully half as much as reducing those levels from 330 to 30 ppm. AIR projects that 5 ppm fuels would reduce VOC plus NO<sub>x</sub> emission by an additional 21-29% compared to 30 ppm fuels. Even assuming that use of 5 ppm sulfur would cost 1.5 times as much as 30 ppm sulfur, the 5 ppm fuel sulfur controls are still 100 percent more cost-effective than vehicle controls. Fuel sulfur must be virtually eliminated before any new vehicle controls would be cost-effective. Reducing fuel sulfur content to either 30 ppm or 5 ppm is more cost effective than reducing vehicle emissions even under EPA's methodology, and especially under superior methodologies. GM provides discussion regarding the legal requirements that EPA demonstrate that the Tier 2 standards are cost effective in comparison to "alternative" sources of emission reductions. GM refers to several subsections of section 202(a), (b), (c), and (i). GM asserts that its conclusions regarding the relative cost-effectiveness of vehicle controls vs. low-sulfur fuels would not change significantly even if higher estimates of the cost per gallon of sulfur control prepared by the oil industry were used. GM cites to the study performed for API by MathPro, Inc. (dated 2/26/99), which estimated that implementing a 40 ppm sulfur standard would cost 2.6 cents per gallon or 55 percent more than EPA's estimate. GM does not accept MathPro's cost estimates at face value, particularly its inclusion of a poorly justified category of costs denominated "ancillary refining cost." If that unnecessary cost category is ignored, MathPro's cost estimates fall to 2.1 cents per gallon. Yet even with this estimate, it would still be more cost effective to impose sulfur controls alone instead of vehicle controls alone. GM also provides significant additional discussion and data that summarizes the costs and cost-effectiveness of both vehicle controls and low-sulfur fuel, and cites to related analyses as performed by AIR, Inc. **(General Motors Corporation (IV-D-209), vol. 1, p. 3; vol. 3, p. 22-27)**

**RESPONSE:** We have determined that there is an air quality need for further emission reductions from mobile sources, and that lowering vehicle certification standards is an efficient and cost-effective way to produce those emission reductions. We have further determined that gasoline sulfur levels must be reduced to 30 ppm in order to enable the next generation of aftertreatment technology to effectively reduce emissions to Tier 2 levels. On this basis we believe that our gasoline sulfur and Tier 2 vehicle standards are inseparable, and we have evaluated the inventory impacts, costs, and cost-effectiveness of

our combined program on this basis.

It is true that gasoline sulfur controls on their own do result in emissions reductions from the in-use fleet. However, it is clear that fuel controls to 30 ppm without commensurate Tier 2 vehicle standards would not generate the amount of emission reductions which a combined fuel and vehicle program does. Given the need for further emission reductions based on air quality need, as well as the cost-effectiveness of the combined Tier 2/gasoline sulfur program, we believe that adoption of a combined program is essential. Our modeling indicates that even with the combined program, several areas would remain in nonattainment in 2007. This problem, and the issues of attainment and maintenance of the standards after 2007, would only be exacerbated by a fuel-only program. It is important to note that, as our combined program is phased-in and the fleet turns over, the majority of emission reductions can be attributed to the vehicle standards rather than the fuel sulfur standards. Thus it is the vehicle standards that produce the greatest benefits from our combined program, with fuel sulfur controls used as an enabling technology.

However, in response to this comment we have evaluated an alternative program in which in-use sulfur levels are reduced to 30 ppm and the NLEV standards are codified to continue in perpetuity. "Fuel only" control must include some assumed level of vehicles control in its baseline, and NLEV is appropriate as it is apparently assumed by the commenter, and was included by EPA in its baseline scenarios. As a result, vehicle costs are assumed to be zero in this scenario, since NLEV will already exist. We have estimated that the NOX + NMHC emissions reductions for this program would only be 77 percent of those that would be produced from our combined Tier 2/gasoline sulfur program in 2007, and only 60 percent in 2010. Since even our combined Tier 2/gasoline sulfur program will not permit all areas to come into attainment in 2007, it is clear that this program would leave us even further from our goal of bringing all areas into attainment. We also evaluated the cost-effectiveness of this alternative program using the same approach as that used to evaluate our combined Tier 2/gasoline sulfur program. The results are shown in Table 24.2.E-1.

**Table 24.2.E-1 Cost-effectiveness of 30 ppm and NLEV**

	<i>Costs (\$)</i>	<i>Tons NOX+NMHC</i>	<i>Cost-effectiveness* \$/ton</i>
Near term costs	117.82	0.04861	2424
Long term costs	111.01	0.04861	2284

\*Does not include crediting for SO<sub>2</sub> or PM

We could also have used Tier 1 vehicles as our baseline in calculating cost-effectiveness, but doing so would increase the \$/ton values because sulfur effects on Tier 1 vehicles are smaller than they are for NLEV.

The values in Table 24.2.E-1 are higher than those for our combined Tier 2/gasoline sulfur program, indicating that a 30 ppm program with NLEV is less cost-effective than our program. In addition, the assumed 30 ppm program with NLEV would only produce 60 percent of the emission reductions of Tier 2/30 ppm program we are finalizing today in year 2010. On the basis of air quality need and cost-effectiveness, then, we do not believe that a 30 ppm sulfur program and NLEV is appropriate.

We note that GM used an approach to cost-effectiveness that differed from our own, in that it examined aggregate costs and tons reduced in specific calendar years, particularly

the earliest years of the program. We believe that our approach is more appropriate because it is the most common approach used in other mobile source rulemakings, and because it takes into account the full realization of emission reductions that go along with the incurred costs. The GM approach, on the other hand, focuses attention on the time period when much of the costs have been incurred but the emission benefits have not yet been realized. The \$/ton values shown in Table 24.2.E-1 are directly comparable to the \$/ton values presented in our final rule, fulfilling the utility of cost-effectiveness as a *relative* measure. Therefore, we believe that our cost-effectiveness analysis of a fuel-only program uses the most appropriate approach.

We also considered the merits of a nationwide 5 ppm gasoline sulfur program, as suggested by the commenter. The feasibility and costs of such a fuels program were discussed in Section V.B.3.c of the RIA. We do not believe that a 5 ppm fuels program is appropriate for several reasons. To begin with, we do not believe that refiners could produce 5 ppm gasoline in the same timeframe that Tier 2 standards would go into effect. Given that the technological challenges of reducing gasoline sulfur levels in the entire pool down to 5 ppm are great, and that little research has been done to date to develop new, lower cost approaches to desulfurizing gasoline to this level, we expect that it would be 2008 or later before we could expect refiners to produce 5 ppm gasoline. Moreover, concerns have been raised about the capability of refiners and distributors to make available gasoline that consistently meets a 5 ppm cap.

In addition, we do not believe that light-duty vehicles need sulfur as low as 5 ppm in order to meet our Tier 2 standards. We believe our Tier 2 standards are achievable with existing catalyst technologies running on 30 ppm fuel. As might be expected, manufacturers are working on advanced engine and emission control technologies aimed at higher fuel efficiency and lower emissions. These technologies are still under development. We do not believe that these technologies, including GDI, are necessary to meet Tier 2 standards. They are not yet in manufacturers' plans. However, if these technologies were introduced to the marketplace, they may need even lower sulfur levels than 30 ppm. We're continuing to evaluate this, but given the lack of such vehicle in the marketplace and the uncertainty about their actual degree of sensitivity to sulfur, we do not believe it would be appropriate to reduce sulfur levels to as low as 5 ppm at this time. Further, the upper bins in our Tier 2 program are intended to allow higher-emitting vehicles to be produced even in the long term.

Long-term emission benefits from a reduction in fuel sulfur levels, absent lower vehicle emission standards, are dependent on EPA not changing the sulfur level of certification fuel to match the sulfur levels of in-use fuel, as we would likely do because certification fuel is intended to be representative of in-use fuels. If EPA did reduce certification fuels to match in-use sulfur levels, new vehicles would be certified on the same fuel they encounter in-use, and would thus produce the same emissions during certification that they would in-use. The 5 ppm in-use standard would effectively produce no emissions benefits for these new vehicles in this case, though there would continue to be a cost for the 5 ppm fuel.

Even though it is unlikely that we would indefinitely leave certification fuel sulfur levels at 30 ppm if the in-use standard was lowered to 5 ppm, we nevertheless evaluated the impacts of this scenario. For the cost of 5 ppm, we assumed 3.8 ¢/gal in comparison to current sulfur levels, consistent with the costs presented in Section V.B.3.C of the RIA. For the emissions impact, we linearly extrapolated the sulfur/emissions relationships that we used in developing our inventory estimates. In comparison to 30 ppm fuel, this extrapolation resulted in an estimate of 7 and 2 percent reduction in NOX and NMHC, respectively, for NLEV vehicles. Note that we have not seen emissions data on SFTP-compliant NLEVs down to 5 ppm, so it is unclear if the emission impacts of 5 ppm that we have estimated are accurate. We do, however, have some results from an Alliance test program which

suggest that the emission effects of lowering sulfur from 30 ppm to below 5 ppm are lower than previously expected.<sup>9</sup>

We assumed that NLEV standards would continue in perpetuity (Tier 2 scenario is discussed below), and that the in-use sulfur standard would not go into effect until 2008. Under these assumptions, the 2010 emission reductions are only 70 percent of those that would be produced from our Tier 2/30 ppm program. The cost-effectiveness values for this program are shown in Table 24.2.E-2.

**Table 24.2.E-2 Cost-effectiveness of 5 ppm and NLEV,  
with no change in certification fuel sulfur levels**

	<i>Costs (\$)</i>	<i>Tons NOX+NMHC</i>	<i>Cost-effectiveness* \$/ton</i>
Near term costs	231.41	0.05903	3920
Long term costs	218.04	0.05903	3694

\*Does not include crediting for SO<sub>2</sub> or PM

Note that all \$/ton values in Table 24.2.E-2 are higher than those for our combined Tier 2/30 ppm fuel program. Thus, not only do we believe that an NLEV/5 ppm fuel program would not be as cost-effective as our program, but as noted above it would only produce 70 percent of the emission reductions as our program in 2010.

A 5 ppm fuel program in concert with our Tier 2 standards would certainly produce some emission benefits for in-use vehicles which have been certified on 30 ppm fuel. However, as discussed above, the benefits from these vehicles would disappear over time if, as is almost certain, certification fuel sulfur levels were lowered commensurate with the in-use sulfur standard. Moreover, we might consider lowering the applicable vehicle standards if certification fuel was lowered to 5 ppm, since our Tier 2 standards are achievable with 30 ppm. If we calculated the cost-effectiveness of a 5 ppm in-use standard under the assumption that certification fuel is also lowered to 5 ppm and Tier 2 standards are implemented, the \$/ton values would be significantly higher than for our combined Tier 2/30 ppm gasoline sulfur program since costs would increase while emission benefits would remain the same (there would likely be a small cost credit for vehicles certified on 5 ppm, but any such credit would be more than offset by the higher cost of the fuel). It is worth noting that even in the highly unlikely scenario of EPA promulgating Tier 2 vehicle standards and 5 ppm sulfur standards and not changing certification fuel standards to match in-use levels, (which would likely be strongly opposed by the commenter), cost-effectiveness levels would still be worse than the levels in the Tier2/sulfur program, at \$3019/ton NMHC + NOX in the near term and \$2639/ton NMHC + NOX in the long term. This would presume 15 and 3 percent reductions in NOX and NMHC emissions between 30 ppm fuel and 5 ppm fuel for Tier 2 vehicles.

Concerning the requirements for demonstrating that Tier 2 is cost-effective in relation to alternatives, only section 202(i) specifically refers to cost-effectiveness, with sections 202(a) and (b)(1)(C) only noting that we should take costs into account in promulgating standards. In any case, we believe we have properly accounted for all the vehicle and fuel costs involved, and that our cost-effectiveness calculations are accurate and appropriate

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<sup>9</sup> See memo from Joseph McDonald to EPA Air Docket A-97-10, "An evaluation of data collected by the Alliance of Automobile Manufacturers on very low sulfur gasoline."

for these purposes. We have shown that the lower emission standards are both necessary and cost-effective compared to either fuel-only option, which are either not protective enough or not cost-effective enough.

## ISSUE 25: BENEFIT/COST ANALYSIS

### Issue 25.1: Epidemiological Data

**COMMENT A:** The valuation for reduced mortality for ozone is based on four selected epidemiological studies but ignores many other negative and equivocal epidemiological studies and extensive human clinical data on ozone. The clinical data do not support the hypothesis that ambient levels of ozone produce mortality. The four studies selected for analysis are also equivocal due to confounding by other pollutants and weather and weaknesses in study design. **(American Petroleum Institute (IV-D-114), p. 25-26, 31-32)**

**RESPONSE:** Recent advice from EPA's Science Advisory Board (July 1999) has raised concerns that mortality-related benefits of air pollution reductions may be overstated if separate pollutant-specific estimates, some of which may have been obtained from models excluding the other pollutants, are aggregated. In addition, there may be important interactions between pollutants and their effect on mortality.

The Pope et al. (1995) study used to quantify PM-related mortality included only PM, so it is unclear to what extent it may include the impacts of ozone or other gaseous pollutants. EPA has accepted the recommendations of the SAB, and has not included ozone-related mortality in developing the primary estimate of ozone benefits for the final Tier 2/Gasoline Sulfur rule.

**COMMENT B:** Some commenters offered critical comments regarding the epidemiological studies used in the PM benefits assessment, with special focus on the prospective cohort studies (i.e. Pope et al., 1995; Dockery et al., 1993; Abbey et al., 1993aB and 1995). Most of the issues raised, such as questions about causality and specific comments on the epidemiological studies, were centered around issues raised during the ozone and PM NAAQS reviews; in fact, one commenter specifically refers to the PM<sub>2.5</sub> NAAQS revisions that were originally proposed in 1996. **(American Petroleum Institute (IV-D-114), p. 25-82, National Petrochemical and Refiners Association (IV-D-118), p. 2, 14, 55-56)**

**RESPONSE:** The basis for the decisions to revise the PM and ozone NAAQS is clearly not at issue in this proceeding. The question in these comments that is pertinent to this proceeding is whether the epidemiological studies are acceptable for use in the benefits assessment for the RIA. EPA believes that the answer to that question is clearly "yes". The epidemiological studies that were reviewed during the recent PM and ozone NAAQS revisions were scrutinized in detail by EPA and outside scientists and the CASAC, and they are not contradicted or rebutted by more recent evidence. Most recently, the Health and Ecological Effects Subcommittee of the Science Advisory Board (SAB) reviewed the use of the epidemiological studies in the benefits analysis, and agreed that the selected studies were indeed valid studies and appropriately used in this analysis (as noted by some commenters).

In response to the general comments about epidemiological studies, we have placed in the docket the Response to Comments documents for the ozone and PM NAAQS revisions (U.S. EPA, 1997a, U.S. EPA 1997b). Those documents contain extended discussions of the issues raised during the NAAQS reviews regarding the epidemiological studies, including:

- the consideration of human clinical data for ozone;
- the use of the "Hill criteria" in assessing causality in epidemiology;
- adjustment for potential confounders (including the analyses conducted by Lipfert, which were available during that review);
- exposure misclassification;

- the form(s) of the concentration-response function and potential effects thresholds from PM and ozone health studies;
- biological plausibility of epidemiological findings;
- subpopulations with greater susceptibility to ozone or PM exposure;
- epidemiological study designs and methodological questions;
- availability of personal exposure measurements; and
- the magnitude of the relative risk estimates.

Those discussions will not be reiterated here. As stated previously, the CASAC and SAB have reviewed these studies, and supported their use in the NAAQS rulemaking process and in conducting benefits assessments.

One comment that was not presented during the recent PM NAAQS review was the attempt to distinguish between “individual-level” and “group-level” data, arguing that “group-level based RR are extreme overestimates when tested with individual-level data from the same study” (API, pp. 49, 54). Briefly, EPA does not agree that these analyses are the “gold standard” for comparison with the epidemiological studies; indeed, for the following reasons, the analyses appear to have far less credibility than the original studies.

The methodology used to obtain the results presented in the “individual” v. “group” level analysis (API, Table 5) is not described in the comments, but the results appear to be similar to those presented by Gamble (1998). If these are indeed using the same methodology, the coefficients for mortality risk estimated for long-term exposures to fine particles are being transported from one model to another in what we believe to be an inappropriate fashion. While it is true that cigarette smoke can contain particulate matter, it is not appropriate to blindly take coefficients from one model and use them in a series of RR calculations for exposures to other pollutants, such as cigarette smoke.

The distinction between “group-level” and “individual-level” is also not clear. The prospective cohort studies had data on the individual participants’ smoking history, and relative risk estimates were calculated using these estimates and presented in the published reports from these studies. The commenters use an estimate of smoking-related particle exposures of 556 ug/m<sup>3</sup> to calculate individual-level risk in one example, but group-level risk in another example. Since the estimate of the smokers’ exposures is developed to represent the average low-tar cigarette smokers’ annual exposure to tar, this would appear to be a group level exposure. We do not see why this hypothetical exposure differential (556 ug/m<sup>3</sup> v. none) is superior to the categorical smoker/nonsmoker and pack-years of smoking data that were available for the individual cohort members and used in the original analyses.

#### **COMMENTS C-J: [Reserved]**

**COMMENT K:** The lack of consideration of the human clinical data in the health benefits valuation for ozone leads to a more conservative assessment of ozone health risks than provided by EPA as part of their recent NAAQS rulemaking. (**American Petroleum Institute (IV-D-114), p. 32**)

**RESPONSE:** The health benefits valuation conducted as part of the Regulatory Impact Analysis for the Tier 2 proposed rule is not a risk assessment such as that conducted for the NAAQS. Instead it is a national level assessment of the potential health-related benefits, examining the full population of potentially exposed individuals, for use in comparison with the costs of the rule. Because of the difficulty in transferring the results of clinical data to the general population (i.e., clinical data is generated in a controlled environment and characteristics of participants may not reflect the characteristics of the general population) the benefits analysis relies on concentration-response functions derived from the epidemiological literature. These functions represent the most likely

response of the exposed population at the national level to changes in air pollution from the Tier 2 regulation.

**COMMENTS L-R:** [Reserved]

**COMMENT S:** Recommends that EPA consider a study on the relationship of particulate air pollution and infant mortality published in Environmental Health Perspectives as further documentation for the benefits of the proposal. **(Children's Environmental Health Network (IV-D-205))**

**RESPONSE:** The study cited by the commenter (Woodruff, et al. 1997) was included by EPA in the high end estimate of benefits for the proposed rule. Recent advice from the EPA Science Advisory Board (July 1999) is that "the various studies of neonatal mortality associated with criteria pollutant concentrations do not provide a sufficient basis for quantifying results at this time."

**COMMENT T:** The scientific evidence relating to the potential health effects attributable to diesel particulate matter simply does not support EPA's alarmist claims regarding increased cancer risks. Commenter cites several studies to support its argument: Clean Air Science Advisory Committee Report, Oct. 20, 1998; Health Effects Institute Report, June 4, 1999; and the Garshick (1987, 1988) and Steenland et al. (1998) studies. **(Engine Manufacturers Association (IV-D-71), p. 25-32)**

**RESPONSE:** Cancer risk was not included in the benefits analysis for the RIA; whether diesel PM is or is not carcinogenic is not relevant in this benefits assessment. (OMS to add to this with their work on diesel PM effects).

**COMMENT U:** [Reserved]

**REFERENCES FOR ISSUE 25.1:**

EPA-SAB-COUNCIL-ADV-99-012, 1999. The Clean Air Act Amendments (CAAA) Section 812 Prospective Study of Costs and Benefits (1999): Advisory by the Health and Ecological Effects Subcommittee on Initial Assessments of Health and Ecological Effects; Part 1. July.

Pope, C.A., III, M.J. Thun, M.M. Namboodiri, D.W. Dockery, J.S. Evans, F.E. Speizer, and C.W. Heath, Jr. 1995. Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of U.S. Adults. *Am. J. Respir. Crit. Care Med.* 151: 669-674.

Woodruff, T.J., J. Grillo and K.C. Schoendorf. 1997. The relationship between selected causes of postneonatal infant mortality and particulate air pollution in the United States. *Environmental Health Perspectives.* 105(6): 608-612.

Gamble JF. 1998. PM<sub>2.5</sub> and mortality in long-term prospective cohort studies: cause-effect or statistical association? *Environ Health Perspect* 106:535-549

U.S. Environmental Protection Agency. 1997a. Responses to Significant



Comments on the 1996 Proposed Rule of the National Ambient Air Quality Standards for Ozone. July.

U.S. Environmental Protection Agency. 1997b. Responses to Significant Comments on the 1996 Proposed Rule of the National Ambient Air Quality Standards for Particulate Matter. July.

**Issue 25.2: Other B/C Analysis Accuracy Issues**

**COMMENT A:** The benefits and costs are uncertain as they are based on questionable assumptions and analyses. **(American Petroleum Institute (Philadelphia - Day 1) (IV-F-131)) (See other letters listed under Comments A.1 through A.5 that follow.)**

**RESPONSE:** Please see issues A.1 through A.5 for specific responses to these comments.

**COMMENT A.1:** EPA's claim that the benefits of the proposed program are as much as five times the cost is based on the use of desulfurization technology that is not yet commercially proven and which refiners may not be able to employ within the required time frame. EPA's benefit estimates are based on epidemiological data that have not been released for external review and on highly questionable valuation subjects. **(Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Senate Committee Materials (IV-D-229), Marathon statement, p. 2)**

**RESPONSE:** As the response to comment 23.2.1 (A) (6) states, EPA shows that the desulfurization technology has been commercially proven and that installation can occur within the required time frame.

The comment does not provide a specific citation for the epidemiological data that has not been released for external review, nor does it provide specific reasons to believe the assumptions of our analysis are faulty, or highly irregular. In determining the benefits of emission reductions on air quality and various health and welfare endpoints, EPA relies on peer reviewed and published studies relating effects of changes in pollutant concentrations to endpoint changes. The methodology and the studies EPA uses to estimate the benefits of the Clean Air Act programs are further peer reviewed by the Health and Ecological Effects Subcommittee (HEES) of the Science Advisory's Board (SAB) Advisory Council on Clean Air Compliance Analyses. The underlying data of the studies used on our analysis (such as the raw data of survey responses or statistical data used to generate reported results in the studies) are typically not available to the EPA since they are generated by the organization that publishes the study. All other data generated and used by EPA (such as the raw data used to assess air quality changes in the benefit analysis) that are an integral part of our analysis are contained in the public docket.

**COMMENT A.2:** EPA's treatment of PM in its cost-benefit analysis is flawed. In the cost-benefit analysis, almost all of the aggregate benefits EPA estimates come from the PM reductions associated with the rule. In Table VII-16 of the RIA, the PM health benefits EPA claims, together with household soiling, and visibility which are caused by PM represent over 90% of the low estimate of benefits and about 85% of the high estimate. The high estimate includes an estimate of excess mortality caused by ozone, an effect which was not included in the risk assessment that EPA prepared during its recent review of the ozone standard. In addition, the estimated monetary benefits from reduced nitrate deposition is not an estimate of the real benefit to the environment and is significantly overestimated. Well over 95% of EPA's estimated benefits are from the PM reductions associated with the rule not the ozone reductions. **(General Motors Corporation (IV-D-209), vol. 2, p. 62-63)**

**RESPONSE:** As the response to comment 25.2.A.1 states, the studies and methodologies used to estimate benefits of Clean Air Act programs undergo substantial peer review by the Science Advisory Board (SAB) and external reviewers. The commenter is correct that approximately 90% of the benefits of the proposed Tier 2 program were attributed to PM

effects. The assumptions noted in the comment as “flaws” in the analysis have been reviewed and supported by the Science Advisory Board (SAB) in advisory letters issued prior to the proposal of the Tier 2 analysis. The analysis for the final rule has again been updated based on additional review by the SAB of the prospective Section 812 study (Nov. 1999) during the summer of 1999. Thus, the analysis revises the approach taken to measure mortality, nitrogen deposition, and other benefit endpoints. As part of these revisions, the analysis for the final rule does not place a value on ozone mortality, or nitrogen deposition.

**COMMENT A.3:** On the cost side, the agency has assumed that the emerging desulfurization technology, not yet commercially proven viable, will work as projected. Second, EPA has assumed that all refiners will default to use this technology. EPA also assumes that the technology will be capable of achieving these levels of sulfur at its projected cost calculations. Finally, EPA assumes that technology vendors will be able to supply the equipment and that virtually the entire industry will install these technologies all within a very brief period. On the benefits side, EPA has also made questionable assumptions. For example, unreasonable values assigned to threshold levels of concentration-response functions and inappropriate valuation of mortality reduction result in inflated benefits. (**American Petroleum Institute (IV-D-114), p. 5, 34-35, National Petrochemical and Refiners Association (IV-D-118), p. )**

**RESPONSE:** Please refer to the response to comment 23.2.1 (A) (6) for a discussion of the fuel cost issues raised in this comment. We note here that our analysis for the final rule now includes use of current technology by some refiners in the near term and considers the need to phase-in changes over time.

The EPA has used methodologies that have been peer reviewed by the SAB and other federal agencies. In the RIA for the final rule (at section VII.D.2), we discuss the issue of thresholds on concentration-response functions. The RIA states “the most recent advice from EPA’s Science Advisory Board is that there is currently no scientific basis for selecting a threshold of 15  $\mu\text{g}/\text{m}^3$  or any other specific threshold for the PM-related health effects considered in this analysis (July 1999). Therefore, for our benefits analysis of the final Tier 2/Gasoline Sulfur rule, we assume there are no thresholds for modeling health effects. It is not appropriate to adopt a threshold for use in either the primary analysis or any alternative calculations because there is no adequate scientific evidence to support such a calculation.” Further, we explore the potential impact of a health effects threshold on avoided incidences of PM-related premature mortality in Appendix VII-A of the RIA. We also give significant consideration to our method for valuing mortality reductions resulting from the Tier 2 program. The RIA for the final rule presents our primary estimate of mortality based on the Pope et. al. study and the “value of a statistical life” approach, as is approved by the SAB. We then present alternative calculations of mortality valuation based on (1) the Dockery et. al. study, and (2) applying the “value of statistical life-years” approach. As is described in the RIA, there are significant issues surrounding the alternative calculations presented in our analysis. The issues associated with these valuation methods or the lack of scientific literature to support these assumptions are the main reason why they cannot be incorporated into EPA’s primary estimate of benefits.

**COMMENT A.4:** EPA’s preliminary RIA is incomplete and does not provide the information necessary to allow timely and complete comments on the proposed rule. EPA has not provided adequate information on the data and modeling limitations of the proposed analysis. Past problems with preliminary and incomplete RIAs led to significantly understated cost estimates. Given that it is unclear whether EPA considered the potential negative health impacts of the Tier II/Sulfur proposal, there is reason to believe that the net

benefits will decrease once EPA addresses this issue more thoroughly in its final RIA. **(McIntosh, D. (IV-D-252), p. 2-4)**

**RESPONSE:** The RIA issued at proposal is complete. EPA has provided copies of all data, reports, studies, and analyses necessary to complete the RIA into the public docket. EPA's analysis does incorporate negative health impacts in developing the Tier 2/gasoline sulfur rule. In our modeling and analysis of the benefits of the proposed rule, we accounted for the full range of NOX effects on ozone and PM, including those few cases where ozone levels were projected to increase. All of these effects are reflected in our total estimate of benefits. Based on these analyses, we concluded that the expected air quality benefits of the proposed rule would greatly outweigh any potential disbenefits. Therefore, the comment that net benefits will decrease once EPA addresses this issue is an inaccurate statement. The analysis for the final rule also takes any negative effects into account when determining total net benefits of the rule.

**COMMENT A.5:** EPA did not provide access to key scientific data used in the benefit-cost analysis of the preliminary RIA. Chapter VII cites to data that are not available to the public. Of particular concern are the data from an epidemiological study of final PM from Pope et al. (1995). This study was criticized by several parties but is responsible for the majority of the benefits in the proposal. EPA should make these data available to the public. EPA should also provide additional justification and/or information regarding the basis for using the Pope Study to justify the gasoline sulfur proposal and should consider whether it is appropriate to calculate public health benefits based on these data when the Pope study is under review by HEI. **(McIntosh, D. (IV-D-252), p. 2-4, National Petrochemical and Refiners Association (IV-D-118), p. 55-56, Peterson, J. (IV-D-254), p. 1, Senate Committee Materials (IV-D-229), Sen. Inhofe, p. 5, U.S. House Committee on Science (IV-D-253), p. 2)**

**RESPONSE:** In determining the benefits of emission reductions on air quality and various health and welfare endpoints, EPA relies on peer reviewed and published studies relating effects of changes in pollutant concentrations to endpoint changes (such as mortality). The methodology and the studies EPA uses to estimate benefits of Clean Air Act programs are further peer reviewed by the Health and Ecological Effects Subcommittee (HEES) of the Science Advisory Board's (SAB) Advisory Council on Clean Air Compliance Analyses. In considering options for assessing the benefits of PM reductions on reduced mortality as part of the Section 812(a) study, the HEES, a panel of experts in the field of health science and economics concluded "In particular, HEES recommends using the revised Pope et al. (1995) results. This is consistent with the retrospective methodology" (HEES, 1999). The RIA notes the scientific and technical uncertainties inherent in making any such estimates, as recognized by EPA staff and the HEES.

This is not the only study in the literature that suggests such effects. Indeed, as HEES points out, a number of studies provide estimates of PM mortality in association with both short and long-term exposures. As such, the HEES recommended that EPA provide an alternative calculation of mortality effects based on a study by Dockery et. al. (see Section VII.3.a of the RIA for the final rule for a full discussion of EPA's analysis of mortality effects). The commenter is correct that an independent review body, the Health Effects Institute (HEI) is reviewing the Pope study again. Unless the HEI reanalysis actually were to find some unanticipated problem, there is no basis to reject the use of a peer reviewed publication for benefits analyses. In fact, although a written report is not yet available, the HEI reanalysis team reported their preliminary findings at the annual HEI conference in May of this year, and the reanalyses results essentially replicate the original studies. Also note that the benefits analysis conducted as part of the RIA is not used to justify the Tier

2/gasoline sulfur rule.

**COMMENT B:** EPA's cost/benefit analysis over-estimates the benefits of reducing ambient levels of ozone and PM. **(See letters listed under Comments B.1 through B.3 that follow.)**

**RESPONSE:** The comment provides no specific basis for its claim that benefits are over-estimated. The EPA believes our method for estimating benefits is based on the best available peer-reviewed scientific evidence in published literature. We disagree that the cost/benefit analysis over-estimates the benefits of reducing ambient levels of ozone and PM.

**COMMENT B.1:** No consideration is given to results of negative or equivocal epidemiological studies. With the exception of PM mortality, the authors assume that the E-R relationships do not exhibit a biological threshold. EPA's failure to take into account negative or equivocal studies runs counter to the D.C. Circuit's recent decision in *ATA v. EPA*. There the court explained that since section 108 of the Clean Air Act required EPA to take into account "all identifiable effects" on public health or welfare when establishing a NAAQS, the Agency is required to take into account positive identifiable effects of a pollutant's presence in the ambient air in formulating air quality criteria and NAAQS. Similar to section 108, section 211(c) requires EPA to take into account all relevant medical, scientific, and economic evidence available. **(American Petroleum Institute (IV-D-114), p. 25-26)**

**RESPONSE:** As the response to 25.1.B shows, the studies used by the EPA have undergone extensive review for the ozone and the PM NAAQS, and by the Science Advisory Board under the CAA Section 812 studies. As is documented in these reviews, we do consider results of "negative" or equivocal studies in our assessment if these studies meet and pass the same level of criteria used for studies that show positive effects. As discussed in the responses to comments on the NAAQS for particulate matter, the "negative" studies mentioned by the commenter did not find statistically significant findings of beneficial health effects, but instead showed associations that failed to reach statistical significance. Thus, no "positive identifiable effects" have been shown in these studies." See U.S. EPA 1997b, page B-2 (reference provided under Issue 25.1 of this document) for a full discussion of the interpretation of negative studies for the PM NAAQS. Thus, we have considered all available medical and scientific evidence pursuant to Section 211(c)(2)(A). We have also considered available economic data, as required by Section 211(c)(2)(B), as discussed in the cost and cost-effectiveness analysis in the RIA for this rulemaking.

As indicated in the response to 25.2.A.3, there is no scientific evidence to support a threshold in any PM health effect. Likewise, there is no evidence of particular thresholds for welfare benefits.

**COMMENT B.2:** Commenter analyzes various tables in the RIA, and notes the impact of the recently remanded 8-hour ozone standard and PM<sub>2.5</sub> standard, as well as the stay of the regional ozone transport rule. Reducing the benefits to account for these actions results in benefits that return only 40 cents for every dollar of cost, according to the commenter. **(Koch Petroleum Group, LP (IV-D-72), p. 41-42)**

**RESPONSE:** It is incorrect for the commenter to assume that the May 14th Court of Appeals decision results in no value for the changes in ozone and PM<sub>2.5</sub>. On June 24, 1999, the EPA issued a supplemental notice of proposed rule making (SNPRM) to provide clarification to some issues associated with the May 14th Court of Appeals decision on the

NAAQS. On page 21 of this clarification, it is stated that the monetized benefit estimates for the Tier 2/gasoline sulfur proposal are not affected by the May 14th Court of Appeals decision and that “none of these pieces of the benefits analysis are dependent upon the specific level of the NAAQS.” More specifically, the benefits to be expected from our rule are derived directly from independently published scientific literature, which is used to estimate the relationship between a given improvement in air quality levels and the resulting health and welfare benefits. The existence or size of such benefits is not dependent upon how EPA sets any particular NAAQS. In general, in its decision, the court did not find fault with the scientific basis for EPA’s determinations regarding adverse health effects from ozone or PM. Therefore, it is incorrect to determine which benefits of the Tier 2 program may be associated with the 8-hour ozone, PM2.5 standards, or the regional ozone transport rule, and eliminate these benefits, because benefits occur at any level of reduction, regardless of the stringency of the NAAQS.

**COMMENT B.3:** For PM mortality benefits, relatively minor (and supportable) changes in EPA’s assumptions significantly reduce the estimated benefits. Valuing lost statistical life-years at \$100,000 each; assuming an 8 year lag rather than a 0 year lag between exposure and mortality; and further assuming the observed association between PM and mortality reflects causal relationships with only a 75 percent probability reduces EPA’s Section 812 study’s estimated benefits of PM mortality from \$16.6 trillion to \$1.1 trillion. For PM-induced chronic bronchitis benefits, EPA relies on a study with improper contingent valuation assumptions as discussed in an OMB memo to EPA. The ozone benefits are based on short-term mortality studies that have not been reviewed by CASAC or SAB, and which are likely misleading. Visibility benefits are based on studies that do not meet government conditions for a reliable contingent valuation survey. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 26-29)**

**RESPONSE:** The commenter’s assumptions for the derivation of an adjusted low-end estimate of benefits are misleading and flawed for the reasons outlined below:

- The \$100,000 life-year value suggested by the commenter is based on medical cost-effectiveness values, and does not reflect the full willingness-to-pay by individuals for reductions in mortality risk, which includes more than just the cost of an incident. The EPA’s estimate of mortality benefits is based on assumptions that have been reviewed and approved by the Science Advisory Board (SAB). Specifically, the SAB has supported EPA’s use of the \$5.9 million (1997\$) estimate of the value of a statistical life (VSL) in calculating our primary estimate of mortality benefits, and also the \$360,000 (in 1997 dollars) per life year derived from the \$5.9 million VSL for use in alternative calculations of mortality benefits (EPA-SAB-ADV-00-002, 1999).
- The commenter is also mistaken in interpreting the SAB 6/30/99 recommendation on the lag between exposure and mortality to be 8 years. Specifically, the SAB “recommends that the Tier 2 SA Lag estimates as presented at the meeting (Table entitled “Sensitivity to Lag Assumption” Attached in Appendix A) be considered as the best estimate for use in the 1999 Section 812 report.” The referenced lag estimate is a 5 year distributed lag with 25 percent of premature deaths occurring in the first year, another 25 percent in the second year, and 16.7 percent in each of the remaining three years.
- No scientific literature or study supports the assumption that there is only a 75% probability of a causal relationship between PM and mortality effects. This assumption is an arbitrary number from a document that has not been published or peer reviewed by the scientific community.

- The commenter is mistaken in interpreting the SAB as suggesting a lag be applied to chronic bronchitis incidences. In the official minutes of the SAB Health and Ecological Effects Subcommittee meeting of June 28 and 29, 1999, it is recorded that the subcommittee members “also noted that the lag was appropriate to introduce only for mortality effects, not for morbidity effects because it would become too complex.” In addition, while the lag for mortality is explicitly defined by the SAB in its advisory letter, no mention is made of a lag for chronic bronchitis. The EPA has followed the SABs recommendations (U.S. EPA, June 1999; and EPA-SAB-ADV-00-001, 1999).
- The EPA disagreed with the points raised in the citation presented by the commenter (memo from Art Fraas to Ron Evans and Bill Harnett). To resolve our disagreement, EPA included a low-end estimate of benefits for chronic bronchitis based on cost-of-illness estimates (which clearly undervalue the true willingness-to-pay to avoid an incident) and kept the studies typically used in several previous RIAs for chronic bronchitis valuation for the high-end estimate. This approach was assumed to provide a bounding of plausible estimates for chronic bronchitis. The EPA also agreed to review the use of these studies with the SAB. In fact, advice from the SAB during the summer after proposal supports EPA’s use of the Viscusi et al. (1991) contingent valuation study to value chronic bronchitis incidences. Specifically, they state:

“The Council concurs with EPA’s continuing use of the adjusted willingness to pay (WTP) value from Viscusi et al.<sup>5</sup> for chronic bronchitis for the following reasons: 1) Appropriate adjustments have been made to transfer the original benefit estimate of WTP for more severe pulmonary disease to the onset of less severe cases of chronic bronchitis associated with exposure to fine particles. 2) While the Viscusi et al. study is the basis for the specific value used, it is not the only study to report that WTP to avoid chronic pulmonary disease is substantial. 3) Criticisms of the Viscusi et al. study have been recognized and addressed by EPA staff and contractors. Further, criticisms that might apply to the application of any CV study to *post hoc* compensation assessments are not as relevant to the use of a CV study in assessing the benefits of *ex ante* actions that reduce the frequency of adverse health effects.”

The “criticisms that might apply to the application of any CV study to *post hoc* compensation assessments” mentioned by the SAB refers to the “conditions the government’s panel of distinguished economists set out for a reliable CV survey,” (the NOAA panel) as noted by the commenter.(EPA-SAB-ADV-00-002, 1999).

- The commenters assumption that visibility benefits should be \$0 is incorrect. There is a value for visibility improvements at deciview measures below one. A deciview corresponds to a change of about 10 percent in available light, which is a small but perceptible scenic change under many circumstances. A change of less than 10 percent in the light extinction budget represents a measurable improvement in visibility, but may not be perceptible to the eye in many cases. Some of the average regional changes in visibility are less than one deciview (i.e. less than 10 percent of the light extinction budget), and thus less than perceptible. However, this does not mean that these changes are not real or significant. EPA asserts that individuals can place values on changes in visibility that may not be perceptible. This is quite plausible if individuals are aware that many regulations lead to small improvements in visibility which when considered together amount to perceptible changes in visibility.

EPA measures changes in visibility in two different categories, residential and

recreational (i.e. in Federal Class I areas). At proposal, we placed a value on both categories of visibility benefits. The analysis for the final rule, however, has modified the approach somewhat due to SAB advice. In reference to the recreational visibility value estimates, an SAB advisory letter (EPA-SAB-COUNCIL-ADV-00-002, 1999) indicates that "many members of the Council believe that the Chestnut and Rowe study is the best available," however, the council did not formally approve use of these estimates because of concerns about the peer-reviewed status of the study. EPA believes the study has received adequate review and has been cited in numerous peer-reviewed publications (Chestnut and Dennis, 1997).

In reference to residential visibility, based on recent SAB advice (EPA-SAB-COUNCIL-ADV-00-002, 1999), EPA has designated the McClelland et al. study as significantly less reliable for regulatory benefit-cost analysis, but it does provide useful estimates on the order of magnitude of residential visibility benefits. Residential visibility benefits are therefore not included in the primary estimate of benefits for the Tier 2 rule.

- As for the estimate of mortality benefits associated with ozone, EPA has also modified the approach presented in the final rule's RIA for these benefits. Our response to the comments outlined in issue 25.1 address the commenter's concerns with the mortality studies used at proposal.

**COMMENT C:** Generally states that due to indirect costs associated with the rule the proposed standards will not have the benefits EPA has claimed. **(Franklin County (OH) (Cleveland) (IV-F-134))**

**RESPONSE:** This comment is based on the argument that if vehicles cost more, the Sheriff's dept. will not be able to purchase as many vehicles as in the past, which produces secondary impacts of more crime (because of fewer response vehicles) and greater operating costs (due to more frequent transport costs in smaller cars rather than current large vans). The commenter concludes that he is not sure the rule is beneficial because of all these secondary costs that may be incurred.

There are a variety of reasons why the EPA believes that the Tier 2 standards will not significantly affect vehicle affordability. This subject is dealt with in the response to comment 23.1.2 and 24.1.P.

**COMMENT D:** There are no measurable PM<sub>10</sub>, PM<sub>2.5</sub>, and/or CO benefits from the Tier 2 rule and thus EPA cannot justify the rule based on PM under either section 202 or 211(c) of the Act. Table VII-1 of the RIA clearly states that there are zero reductions in PM<sub>10</sub>, PM<sub>2.5</sub> and CO from the Tier 2 rule. EPA's attempt to predict a 0.7% PM<sub>10</sub> change and a 1.5% PM<sub>2.5</sub> change are below the model accuracy limitations. **(American Petroleum Institute (IV-D-114), p. 96, Marathon Ashland Petroleum LLC (IV-D-81), p. 31-32)**

**RESPONSE:** Although Table VII-1 does not show direct reductions of PM<sub>10</sub>, and PM<sub>2.5</sub>, the health benefits of reducing these pollutants are derived from NO<sub>x</sub> and VOC reductions required under Tier 2 and are accounted for only in the benefit analysis. The final rule also considers reductions in SO<sub>2</sub>.

The results of our air quality analysis for PM does show relatively small average changes in PM. It should be noted, however, that the changes in annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations reported by the commenter are from Table VII-3 of the proposal's RIA,



which are the reported average concentrations over the entire U.S. As Exhibits A-2 (Changes in Annual Mean PM<sub>2.5</sub>), and A-4 (Changes in Annual Median PM<sub>2.5</sub>) of the report titled: *Tier II Proposed Rule: Air Quality Estimation, Selected Health and Welfare Benefits Methods, and Benefit Analysis Results* show, there is a wide variation in the changes in annual mean and median PM<sub>2.5</sub> over the U.S., with very small changes in the western U.S. and relatively larger changes in the Eastern U.S., especially in population centers such as New York City, Atlanta, and Detroit. Thus, observed reductions in health benefits are associated with the relatively larger PM<sub>10</sub> and PM<sub>2.5</sub> reductions in the population centers, not with the very small average changes reported by the commenter.

The use of small average changes in nationwide annual average PM does not inherently overstate the estimated benefits associated with PM exposures. While uncertainty always exists in estimating small changes in air quality, EPA maintains that the fuel sulfur program will reduce particle levels and these will produce benefits. From an analytical perspective, use of small changes would not introduce bias into the benefits estimates, which are based on a linear assumption that is most valid for smaller differences.

EPA also maintains that the emission control technology used to comply with the Tier 2 standards will result in considerable reductions in CO emissions. EPA has not specifically quantified this level.

**COMMENT E:** Commenter provides a net present value analysis to argue that under all reasonable assumptions costs will outweigh benefits. **(See letters listed under Comments E.1 and E.2 that follow.)**

**RESPONSE:** Please see Issues E.1 and E.2 below for specific responses to the comment.

**COMMENT E.1:** The net present value of benefits over the 2000-2003 period is likely to fall within the \$8.2 billion to \$28.3 billion range, most likely near the lower end of this range. **(American Petroleum Institute (IV-D-114), p. 103)**

**RESPONSE:** There are several reasons why EPA does not support the commenter's calculation of the net present value of benefits using a weighting scheme based on PM<sub>2.5</sub> precursor reductions over time: 1) A properly conducted analysis of net present value would take into account the dynamic interactions between emission reductions and air quality, i.e. a ton of emission reductions in different years will not necessarily yield equivalent reductions in ambient pollution levels; 2) weights cannot easily be developed based solely on the total projected emission reductions of PM<sub>2.5</sub> precursors because of the disproportionate impact of SO<sub>2</sub> and NO<sub>x</sub> reductions in the formation of PM<sub>2.5</sub>; 3) the commenter has assumed that the benefits are constant across years. EPA's analysis estimates annual benefits for the analytical year 2010, given 2010 populations, VMT, and income. It is likely that in years subsequent to 2010, populations, VMT, and income will all increase, leading to substantially higher benefits in these future years; 4) Based on advice from the EPA Science Advisory Board, EPA has selected 5% as the appropriate discount rate when discounting benefits and costs for regulatory analysis; 5) the commenter takes the present value at year 2000, while implementation of the program does not begin until 2004; 6) Benefits and costs accrue well beyond the 2030 date analyzed by the commenter. Adding only a few years to the analysis leads to the net present value of benefits (high estimate) exceeding the high end cost estimate presented by the commenter, even when assuming zero population growth.

Additionally, as has been stated in several prior responses in this section, the commenter's assumptions to derive a low end estimate of benefits is flawed. EPA disagrees that the

benefits of the Tier 2 program are more likely near the low-end of estimates. Also, the midpoint of the range of estimates provided by the commenter is not based on any scientific finding that the mean of the distribution of benefits would occur midway between the bounds provided in the comment. In fact, EPA's best estimate (provided in a memo to the docket at proposal) was \$16.6 billion at proposal, which is not a midpoint estimate of the low and high-end estimates provided in the proposal's RIA. Thus, it is misleading to state that the range of benefits of the Tier 2 proposal are between the low-end estimate and the calculated midpoint of a range of estimates.

**COMMENT E.2:** Commenter provides a comparison of the various net present cost and benefit values to show that costs will outweigh benefits. **(American Petroleum Institute (IV-D-114), p. 99-109)**

**RESPONSE:** Based on EPA's responses to Issues 23, and 25, we disagree with the commenters conclusion that net present value of costs will outweigh benefits. In fact, the analysis for the final rule, which is based closely on recommendations by the EPA's Science Advisory Board and detailed in the reanalysis of costs, shows that benefits greatly outweigh costs.

**COMMENT F:** Although a net present value approach should be used, commenter argues that actual costs of the Tier 2 program would exceed benefits in the steady state. Based on the supplemental notice, EPA needs to reduce the ozone and PM10 benefits to reflect the reduced populations, and eliminate the PM2.5 benefits. Even if PM2.5 benefits are included, EPA should use the low-end estimate that assumes no physiological effect at concentrations below the PM2.5 NAAQS standard set by EPA. Under these benefit assumptions, costs would exceed benefits in the steady-state. **(American Petroleum Institute (IV-D-114), p. 98, Marathon Ashland Petroleum LLC (IV-D-81), p. 34)**

**RESPONSE:** The purpose of the supplemental notice provided by EPA in June of 1999 was to clarify how the ruling by the D.C. Circuit Court of Appeals would alter the results presented in the April 1999 documents of the Tier 2 proposal. The supplemental notice, therefore, presents data on populations in nonattainment areas if the 8-hour ozone and PM2.5 NAAQS were not implemented as a final result of the court appeal. However, no confusion should exist on whether the existence of any particular ozone or PM NAAQS has any implications for the conduct of benefits analyses. On June 24, 1999, EPA issued a clarification of the Tier 2 NPRM to provide supplemental information on the proposed rulemaking. On page 21 of this clarification, it is stated that "none of these pieces of the benefits analysis are dependent upon the specific level of the NAAQS." More specifically, the methodology used to estimate benefits are based on the underlying scientific literature relating effects of changes in pollutant concentrations to endpoint changes (such as mortality), which is not dependent on the NAAQS. Therefore, the EPA uses the scientific literature as a reference source for any benefit analysis of environmental policy that results in ozone or PM2.5 reductions, even if the goal of the policy is not directly related to the reduction of ozone or fine particles. In addition, we apply this information to all of the U.S. population that will experience improved health and welfare from reductions in pollutant concentrations (not just to populations in nonattainment areas). Please refer to the response to Issue 25.2.A.3 for further discussion of the issues of thresholds on effects.

**COMMENT G:** EPA's benefit-cost analysis, by focusing on the benefits and costs of the program for one particular future year (after complete fleet turnover to Tier 2 vehicles has been achieved) yields an incorrect and misleading account of program benefits and costs. More specifically, the annual steady-state cost estimate of \$3.5 billion used by the EPA

benefit-cost analysis does not include the required up front capital investment costs associated with the proposal. **(American Petroleum Institute (IV-D-114), p. 98-99, 102, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 29-30)**

**RESPONSE:** EPA recognizes that a single representative year analysis does not capture all of the information that would be obtained by analyzing the benefits and costs in each year. However, it is not analytically feasible to conduct a year-by-year benefits analysis due to the complexity and input data needs of the modeling which is involved. EPA believes that by analyzing benefits and costs in a future year where the rule is fully implemented, EPA has characterized the long-term steady state annual benefits better than using an average of benefits in earlier years when the rule has not been fully implemented. The inclusion of near-term capital investment costs does not substantially change the results of EPA's analysis. As shown in the proposal's RIA, making this change would increase the cost estimate from \$3.5 billion to \$4.3 billion.

**COMMENT H:** Since a significant portion of the vehicle and fuel costs are represented by the large capital investments required at the beginning of the program and the benefits are accrued only slowly over many years, EPA's benefit-cost analysis must accurately reflect the temporal nature of the fleet changeover and discount the value of future benefits in a manner similar to that used in the cost effectiveness evaluation. **(American Petroleum Institute (IV-D-114), p. 97, 99, 102, Marathon Ashland Petroleum LLC (IV-D-81), p. 33)**

**RESPONSE:** As described in the proposal's RIA, EPA chose to account for the temporal differences between when costs are incurred and when benefits are realized by an appropriate inflation of the cost. The commenter provides no information to indicate that this approach is inaccurate.

**COMMENT I:** Certain disbenefits of sulfur reduction are not addressed by the Tier 2 rule. For example, EPA needs to quantify the ammonia emissions effects and project the increase in PM10 and PM2.5 emissions due to secondary particulate formation that results from the increase in ammonia. Another example is potential increased PM2.5 emissions that may occur as a result of the proposal (even though PM10 emissions may be reduced). [See also Issue 27.3.D.] In addition to these disbenefits, and in the process of overvaluing the incentive to reduce SO<sub>x</sub>, EPA also failed to recognize certain benefits associated with sulfur dioxide. For example, sulfur dioxide in the atmosphere is credited as a retardant of global warming. Recently disclosed information by the Intergovernmental Panel on Climate Change (IPCC) was analyzed by Mr. Tom M.L. Wigley of the National Center for Atmospheric Research ("Global Warming Estimates Rise Slightly"), (Washington Post, June 30, 1999). Mr. Wigley advises that new estimates from IPCC "suggest that the mean warming of the globe's surface will be slightly higher at about 2.3 to 7.3 degrees Fahrenheit (versus the previous estimated increase of 1.4 to 6.3 degrees Fahrenheit) by the end of the next century. The new estimates are predominantly due to forecasting lower levels of sulfur dioxide emissions than were previously assumed, according to Mr. Wigley. **(American Petroleum Institute (IV-D-114), p. 19, 97-98, Marathon Ashland Petroleum LLC (IV-D-81), p. 24-25, 34)**

**RESPONSE:** As the response to issue 25.2.L states, the EPA does not agree that ammonia emissions will increase. Thus, there will not be an associated increase in PM 2.5 and PM10 due to ammonia emissions. The EPA also disagrees that the Tier 2 program will result in increases in PM2.5 or changes in global warming, as is explained in our responses to issues 27.3.D and 27.2.E.

**COMMENT J:** Emission reductions in non-transport attainment areas have no value. Thus, the claimed public health benefits in non-transport attainment areas cannot be used as benefits in the benefit-cost analysis nor used to justify the Tier 2 rule. **(American Petroleum Institute (IV-D-114), p. 92-93, Marathon Ashland Petroleum LLC (IV-D-81), p. 31)**

**RESPONSE:** In determining the impact of emission reductions on air quality and various health and welfare endpoints, EPA relies solely on the underlying scientific literature relating effects of changes in pollutant concentrations to endpoint changes (such as mortality, or respiratory illness). These studies are conducted and peer reviewed independently from any process used to determine the level of the ozone or PM NAAQS. Any of the scientific literature used in the benefit analysis, therefore, does not have a direct association with level of the NAAQS. Thus, we apply the observed associations from the scientific literature to all affected populations, not just to those areas of non-attainment with the ozone and PM NAAQS, or ozone transport areas. See also response to issue 24.1.H and I for more discussion on this topic.

**COMMENT K:** EPA's use of a high-end estimate of the value of a statistical life is inappropriate and highly misleading because of the discrepancy in life expectancy between the target population of interest and the population from which the estimate was derived. EPA should use only a valuation or range of valuations based on the value of statistical life-years lost rather than including a high-end estimate based on the full value of a statistical life. Basing value-of-life estimates on the value of remaining life-years is a superior methodology and is more likely to yield an estimate closer to the actual value. Total benefits drop from \$19.5 billion to \$10.5 billion when applying the statistical value-of-life estimate based on life-years to the high incidence (background concentration-response PM2.5 threshold) scenario. **(American Petroleum Institute (IV-D-114), p. 26, 34, 100-101)**

**RESPONSE:** As the response to 25.2.A.3 and 25.2.b.3 state, the EPA has adopted the methodology of the Section 812 study (EPA, 1999) which have undergone extensive review by the SAB. The SAB recommends the use of the value of a statistical life (VSL) for our primary estimate of benefits and the value of a statistical life-year (VSLY) approach as an alternative calculation. The VSL used at proposal (\$5.9 million per life in 1997 dollars) was reviewed by the SAB council during the summer of 1999, and they concur with EPA's interpretation and use of this value. For the VSLY approach, we also use a value recommended and approved by the SAB (\$360,000 per life-year in 1997 dollars), which is based on a 35-year life expectancy and a five percent discount rate. Therefore, the EPA addresses the commenter's concerns by providing an alternative estimate showing how the use of VSLY affects total benefits.

**COMMENT L :** The negative health and environmental impacts (i.e. NO<sub>x</sub> disbenefits) that may be imposed on some areas by the rule's national approach may have significant costs. EPA did not adequately consider regulatory alternatives that allow for indefinite exemptions in areas negatively impacted by the rule and did not adequately consider the potential negative health impacts. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 6) (See other letter listed under Comment L.1 that follows.)**

**RESPONSE:** As the response to issue 27.1.H shows, the EPA has given considerable consideration to potential negative health and environmental impacts that may be imposed on some areas of the country. Overall, the benefit analysis presents the net total benefits of the Tier 2 program on the nation, which demonstrates that the Tier 2 rule is beneficial to the country. To the extent that disbenefits (or "environmental costs" as it is referred to in the RIA of the final rule) are predicted, they are incorporated in the total benefits calculation as a negative effect. Please see issue 27.1.H for a full discussion of the issue.

**COMMENT L.1:** Congressman McIntosh provides additional discussion regarding the potential costs associated with NO<sub>x</sub> disbenefits and the need for EPA to provide additional data and analysis regarding this issue. McIntosh also cites to the following: Memorandum to ECOS and OTAG Implementation Issues & Strategies Workgroup and the Criteria Evaluation Mini-workgroup from OTAG ISI Task Group: Criteria for Modeling & Strategy Refinement regarding NO<sub>x</sub> disbenefits, dated December 12, 1996; OTAG Final Report to EPA, Chapter 6, Sec. 5, dated December 12, 1996; Tier II Proposed Rule (RIA): Exhibit A-19 and A-21; Rethinking the Ozone Problem in Urban and Regional Air Pollution, National Research Council, dated 1991; and On a NO<sub>x</sub>-Focused Control Strategy to Reduce Ozone, George T. Wolff, Air & Waste, Vol. 43, p. 1593, December 1993. **(McIntosh, D. (IV-D-252), p. 2-4)**

**RESPONSE:** Please see our response to issue 27.1.H for a full discussion of our consideration of this issue.

**COMMENT M:** EPA does not quantify the amount of nitrate deposition from vehicles, nor does it compare these depositions to deposition from other sources or from point and non-point water discharges. It must do this in its cost/benefit analysis. **(Koch Petroleum Group, LP (IV-D-72), p. 44)**

**RESPONSE:** The benefit analysis at proposal quantified and valued the change in nitrate deposition at 12 East Coast estuaries. For the final rule, we are quantifying changes in nitrogen deposition at these estuaries, but do not assign a benefit value to them. Our analysis does show the comparison of total loadings from all sources, from air sources, and the associated reductions due to the Tier 2 program (see Table VII-7 and VII-13 of the final rule's RIA. However, since the goal of the Tier 2 program is to reduce air pollutants associated with the NAAQS, we question the need for an in-depth comparison sources of nitrogen deposition relative to Tier 2. The presentation of nitrogen deposition benefits is due to secondary effects of the controls chosen to achieve the program goal of criteria air pollutant reductions.

**COMMENT N:** EPA needs to shift from reliance on cost-effectiveness analyses (\$/ton) to cost/benefit analyses. **(Rao, P. (IV-D-103))**

**RESPONSE:** The benefit analysis is required by Executive Order 12866 as a tool to evaluate the impact of the rule on society. It is prepared as a supplement to the information provided by the cost and economic analyses, air quality analysis, and the cost-effectiveness analysis. Each analysis provides different information to readers and decision makers. Due to the significant uncertainties in estimating benefits, EPA is unable to fully capture all of the benefits of the rule, and thus should not base its decision solely on this tool. A combination of all the analyses provides a full picture of the effects of the Tier 2 rule on society.

**COMMENT O:** Commenter provides miscellaneous comments on specific statements in the RIA. Correct page B-9 to indicate that API aged catalysts with 4,000 miles of mixed city/highway driving at average speed of 40 mph; in Table B-4, change NMHC reversibility for the 98 Nissan Altima to "NA" from "800%"; and calculations of fleet estimates in Tables B-2 and B-4 are unclear because they are not arithmetic averages and cannot be reproduced from CRC or API data. **(American Petroleum Institute (IV-D-114), p. 125)**

**RESPONSE:**

**COMMENT P:** EPA's NPRM and supporting documentation point to the number of people in a nonattainment area as support for its proposed regulations. However, these statistics are somewhat misleading in that often a nonattainment area's status is driven by only one out of an extensive set of monitors placed in a metropolitan area. **(American Petroleum Institute (IV-D-114), p. 23)**

**RESPONSE:** EPA is aware that not all the population of a metropolitan area, or even on a single county, is exposed to the air quality levels indicated by any one monitor. Levels at other locations within the metropolitan area may be higher or lower than at that monitor. All locations within a nonattainment area are, by definition, locations where emissions contribute to nonattainment in the area. The manner in which EPA determines compliance with the NAAQS is covered in other regulations and is not at issue in this rulemaking. For ozone, nonattainment boundaries generally are similar to metropolitan statistical area boundaries, making MSA statistics on populations a convenient indicator of the scope of the need for additional emission reductions.

Because the baseline emission control scenario in most of the areas we predict to be in need of additional emission reductions already includes stringent control of most large point emission sources, the alternatives means to provide for attainment and maintenance would most likely involve emission controls on sources that, like vehicles, are dispersed throughout the ozone nonattainment area or MSA.

The sum of the MSA populations also is an indication of what fraction of the cleaner Tier 2 vehicle fleet will be operating in areas that require additional reduction, although it must be noted that due to migration of vehicles after sale the fraction of Tier 2 vehicles that at some time will contribute to emission reductions in areas needing reductions is larger than the population fraction of those areas. In addition, vehicles operating upwind of these areas will contribute to reduced ozone concentrations.

For PM10, nonattainment area boundaries generally follow county lines, because the extent of PM10 concentrations above the NAAQS is generally more restricted than for ozone. We have correspondingly used only county populations in describing the scope of the PM10 nonattainment problem now and in the future. However, because vehicles move around among counties within a metropolitan area, more of the Tier 2 fleet will be contributing to reduced PM10 in PM10 nonattainment areas than indicated by the human population figures.

Our estimates of health impacts and benefits from the Tier 2/Gasoline Sulfur program is based on ozone concentration estimates and population figures for ozone modeling grid cells, which are smaller than counties in most states. Thus, we do not assume that all residents of a county or metropolitan area experience the concentration reductions that are predicted for the monitored locations. For PM10 health impacts, the analysis is done at the county level.

**COMMENT Q:** EPA's analysis fails to include true societal costs of the vehicle and fuel proposals but rather only direct compliance costs. A cited study has shown that societal costs can be one-and-a-half times compliance costs. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 30)**

**RESPONSE:** The Hazilla-Kopp study cited by the commenter is a general equilibrium model based on macroeconomic theory. This study is based on one particular simulation of the economy, using 1970-1985 data for highly aggregated control costs. More recent literature has come to similar conclusions using Computable General Equilibrium (CGE) models (a

representative recent paper is Parry (Parry, Ian W. H., 1997. "Environmental Taxes and Quotas in the Presence of Distorting Taxes in Factor Markets," *Resource and Energy Economics* 19:203-20). EPA is following these research developments with interest. We have not included general equilibrium adjustments for the Tier 2 rule for three reasons:

1. The models that generate the estimates are intended to be useful for qualitative, general results and not for accurate predictions on the effects of individual rules. EPA does not have access to any validated, contemporary models covering the regulated sector in detail and the US economy in general that would allow plausible estimation of the effects of the Tier 2 rule. To the best of our knowledge, no one else does either.
2. The Hazilla-Kopp estimate cited in the paper is an average for all air and water regulations, not the marginal effects for a specific marginal set of regulations like Tier 2.
3. Hazilla and Kopp recognize on p. 866 "While the 1981 [*italics added*] social cost estimate is significantly lower than the EPA estimate, one cannot conclude that social costs are always less than comparable costs based on private expenditures." This is a recognition that the results of this particular model, while interesting and valuable, are not broadly generalizable to all pollution control regulation analyses.

Therefore, it is misleading to conclude that the societal costs of Tier 2 may be one-and-one-half times the compliance costs. Our compliance cost estimates provide a plausible estimate of total social cost that one would derive from a partial equilibrium analysis, which provides more detail at the market level. Therefore, EPA believes that its economic analysis in support of the Tier 2/gasoline sulfur rule does include the associated societal costs, though not in a general equilibrium framework.

#### REFERENCES FOR ISSUE 25.2:

EPA-SAB-COUNCIL-ADV-00-002, 1999. The Clean Air Act Amendments (CAAA) Section 812 Prospective Study of Costs and Benefits (1999): Advisory by the Advisory Council on Clean Air Compliance Analysis: Costs and Benefits of the CAAA.

U.S. Environmental Protection Agency Science Advisory Board Advisory Council on Clean Air Act Compliance Analysis Health and Ecological Effects Subcommittee. July 7, 1999. Summary Minutes of Public Meeting June 28-29, 1999. Available at <http://www.epa.gov/sab>.

EPA-SAB-COUNCIL-ADV-00-001, 1999. The Clean Air Act Amendments (CAAA) Section 812 Prospective Study of Costs and Benefits (1999): Advisory by the Health and Ecological Effects Subcommittee on Initial Assessments of Health and Ecological Effects; Part 2. October.

### **Issue 25.3: General Benefit/Cost Analysis Issues**

**COMMENT A:** The benefits far outweigh the costs. The estimated costs are very reasonable considering the significant benefits that will be achieved with respect to improved air quality and reduced health care costs nationwide. **(American Lung Association (Philadelphia - Day 1) (IV-F-131), Appalachian Mountain Club (IV-D-251), Cohen, David L. (IV-F-23), Environmental Defense Fund (IV-F-128), Evangelical Environmental Network (IV-F-22), Fletcher, Robert E. (Atlanta) (IV-F-132), Mittledorf, Joshua (IV-F-21), Oregon Department of Environmental Quality (IV-F-57), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), Physicians for Social Responsibility (IV-D-194), Robinson, Linda (Cleveland) (IV-F-134), STAPPA/ALAPCO (IV-F-5), Sierra Club (IV-F-3), Sierra Club (Philadelphia - Day 2) (IV-F-131), Tennessee Environmental Council (Atlanta) (IV-F-132), Thurston, G.D. (IV-F-130), U.S. Public Interest Research Group (Atlanta) (IV-F-132))** (See other letters listed under Comments A.1 and A.2 that follow.)

**RESPONSE:** We agree with these comments.

**COMMENT A.1:** STAPPA and ALAPCO conducted an analysis concluding that a national low-sulfur gasoline program of the scope proposed by EPA will achieve overnight emissions reductions equivalent to taking 54 million vehicles off the road. **(STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77))**

**RESPONSE:** The EPA agrees that our Tier 2 program will be beneficial to the nation, but has not verified specifically that the emission reductions are equivalent to removing 54 million vehicles from the road.

**COMMENT A.2:** Commenter refers to a study conducted by a Cincinnati Health Department official that documented significant increase in respiratory ailment treatments after high ozone days. EPA should conduct similar study for the entire nation. **(Sierra Club, Ohio Chapter Energy Committee (IV-D-101))**

**RESPONSE:** The EPA agrees with the commenter that additional study at the national level for respiratory ailment and several other health and welfare endpoints is needed. However, the time and resources needed to conduct such research is currently not available for the analysis of the Tier 2 program.

**COMMENT B:** Costs are too high, particularly when compared to the benefits, which are not significant. **(American Farm Bureau Federation (IV-D-143), American Petroleum Institute (Philadelphia - Day 1) (IV-F-131), Georgia Coalition for Vehicle Choice (IV-F-34))** (See other letters listed under Comments B.1 and B.2 that follow.)

**RESPONSE:** We received a mix of comments on the issue of program costs, some comments, such as these here, expressed that the costs were too high, while other comments stated that the costs are reasonable. We estimated the costs for both the fuel and vehicle program, and compared those costs to the emission reductions. Based on this comparison, we find this program to be cost-effective.

**COMMENT B.1:** To comply with the rule, refiners will have to install additional processing equipment, including process furnaces, valves, fittings, and pump seals. In addition, other existing units such as hydrogen plants, sulfur plants, and wastewater systems will be affected. Not only do each of these stationary items have a cost, they are also stationary emission sources which will offset mobile source emission reductions. **(Flying J Inc.**



**(IV-D-151), p. 3-4)**

**RESPONSE:** We first determined the types of capital investments which refiners are expected to make to desulfurize their gasoline, then we estimated the cost of those investments. This included the cost of the desulfurization unit, the hydrogen and utilities required, and the cost of making up the octane loss, if there was any. Our analysis of these costs is contained in Chapter V of the RIA.

We also estimated the stationary source emissions from refineries based on the emissions from the gasoline hydrotreater, a reformer unit for making up needed octane and producing hydrogen, and a hydrogen plant for producing the balance of hydrogen. When we compared the NOX emissions increases from these refinery units in 2010 with the NOX emission decreases from lower polluting cars and trucks for that same year, the emission increases only amounted to one quarter of one percent of the motor vehicle emission benefits. In later years the difference is even greater. The complete analysis on the emissions from refineries is contained in Appendix C of the RIA.

**COMMENT B.2:** The rule results in basically no PM ambient air quality improvement.  
**(National Petrochemical and Refiners Association (IV-D-118), p. 54-55)**

**RESPONSE:** As is indicated in the response to 25.2.D, while the “average” change in PM reported in Table VII-3 of the proposal’s RIA is small, the change in PM concentrations vary greatly by location. In fact, there are relatively larger absolute changes in Eastern U.S. population centers, which result in substantial benefits to the nation.

**COMMENT C:** [Reserved]

**COMMENT D:** Federal transportation conformity regulations have little to do with the improvements in air quality achieved to date. The small air quality benefits are dwarfed by the adverse public health and safety consequences (costs) of delaying or preventing needed improvements to our transportation system. Conformity needs to be redefined.  
**(American Road and Transportation Builders Association (IV-D-162), p. 3-6)**

**RESPONSE:** This comment does not pertain to the issues associated with the Tier 2/gasoline sulfur rule.

## **ISSUE 26: TECHNOLOGICAL FEASIBILITY**

### **Issue 26.1: Vehicle Emission Standards**

#### **Issue 26.1.1: Accuracy of EPA Analysis - Tech Feasibility/Vehicles**

**COMMENTS A-C:** EPA has not shown that compliance with certain vehicle standards is technologically feasible. EPA's assertion that "development, application, and optimization of ... existing technologies" will enable compliance with the proposed standards rests on flawed premises; that is, that improvements have occurred in the past and that certification data shows that some vehicles are presently at or near the proposed standards. Neither of those assertions adequately supports EPA's feasibility determination. Historical improvements do not necessarily indicate that similar improvements will be possible in the future. In addition, vehicles used for certification purposes are minimally impacted by fuel sulfur. To ensure that it is feasible to produce vehicles that will fall within the compliance margin, EPA must consider the emissions of real-world cars, not only certification data. Also, the certification data used by EPA is skewed toward smaller cars, not the full range of vehicles that must meet the new standards. EPA assumes that technologies available for light-duty vehicles would be feasible for trucks weighing up to 8,500 lbs. One of the commenters also notes that EPA has failed to demonstrate that, even if the controls are available, they will be affordable or acceptable to consumers, or that they will not have safety or energy impacts that compromise their widespread use. For all of these reasons, the commenter concludes that EPA has not met the statutory requirements in Section 202(i). **(General Motors Corporation (IV-D-209), vol. 1, p. 35-36, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 7, U.S. Chamber of Commerce (IV-D-142), p. 4)**

The technological options suggested by EPA to reduce vehicle emissions all have some limitations with respect to the sulfur levels in the fuel. Aside from the limitations associated with increasing precious metal loading and improved metal dispersion, there are also limitations (with respect to the sulfur levels in fuel) associated with other technologies as well. AAM discusses the limitations associated with catalyzed particulate filters, regeneration, SIDI (gasoline) engines, CIDI (diesel) engines, selective catalytic reduction (SCR), heated catalysts, and fuel cells. Based on the technological limitations, there is no technological solution that would achieve the same emissions benefits as low sulfur fuel. **(Alliance of Automobile Manufacturers (IV-D-115), p. 118-120)**

EPA presents some options in the RIA for improving the effectiveness of catalytic converters, which includes primarily increasing and improving precious metal loading. However, increased precious metal loading is ineffective for preventing sulfur poisoning. Theoretical analysis and basic research show that increased precious metal loading is ineffective for preventing sulfur poisoning and has reached a point of diminishing returns such that the expensive extra catalyst would provide little or no added benefit. In addition, this approach has numerous associated and unaccounted for costs including added design, development, testing, cost, purchasing, and lifecycle environmental impacts. Automakers could end up with a very expensive and bulky catalyst system that is either unable to provide much benefit or that is even more sensitive to sulfur due to its increased reactivity. AAM cites to Gandhi, "Effect of Fuel Sulfur on Automotive Three-Way Catalysts," presented at CRC Auto/Oil Symposium, dated 9/97, and test data from Ford and Honda that demonstrates the effect of different precious metal loadings. **(Alliance of Automobile Manufacturers (IV-D-115), p. 112-113)**

**RESPONSE:** In our RIA, we have data supporting the feasibility of our Tier 2 standards from several test programs, including work from CARB, MECA and EPA. In all, we have

data from approximately a dozen vehicles supporting the feasibility of Tier 2 standards. The majority of these vehicles have emission levels that fall within acceptable compliance margins. Thus, we have not relied solely on certification data to support the feasibility of Tier 2 standards. Certification data represents worst case vehicle configurations at full useful life (100,000 to 120,000 miles) and are perfectly valid data for establishing feasibility of emission standards. While it is true that a specific certified vehicle configuration is not representative of future vehicle configurations, it does indicate that the technologies and strategies exist that may be used to meet tighter future standards. Therefore, we believe that certification data for vehicles at or below Tier 2 standards provide strong evidence of Tier 2 feasibility. Thus, we believe we have adequately proved that our standards are technologically feasible for all vehicles and trucks subject to the standards promulgated today. We feel that the technology improvements needed to meet the standards are well understood and that much of the development needed to meet the standards will be in the areas of optimizing emissions control systems and calibrations.

General Motors commented that the certification data used by EPA was skewed towards smaller cars. First of all, as stated above, While the preponderance of vehicles certified at or close to Tier 2 levels in the NPRM (1999 model year) tended to be smaller vehicles, the certification data for 2000 model year vehicles exhibit an even distribution of models certified at or near Tier 2 standards. In fact, the largest number of vehicles in the database (based on vehicle models) were midsize cars.

Another commenter asserted that all of the technological options suggested by EPA to reduce vehicle emissions have some limitations with respect to sulfur levels in the fuel. While not all the technologies discussed in the RIA are impacted by sulfur (e.g., engine improvements), we agree that the exhaust aftertreatment technologies (e.g., catalysts, traps, etc.) and some advanced technologies are very sensitive to sulfur. We also agree that no vehicle-only technology will be as effective in reducing vehicle emissions, or as cost-effective, as combining vehicle-based technologies with reducing sulfur in fuel. That is why we are proposing low sulfur gasoline levels as part of the Tier 2 regulations.

An in-depth discussion on our rationale for technical feasibility, as well as a description of the technologies and strategies that will be employed are found in Chapters 4 and 5 of the RIA. We also discuss the fact that our basis for feasibility is based on the assumption of using low sulfur fuel. Therefore, we continue to believe our standards are technologically feasible.

#### **Issue 26.1.2: Other Technical Feasibility Issues (Vehicles)**

**COMMENTS A-F, H, I, K, L, and P:** Many commenters argue that it is technically feasible for automobile manufacturers to meet the Tier 2 standards. Ford's recent announcement that it is cleaning up emission from its pick-ups, and its prior decision to clean up SUV emissions, shows that technology exists to produce cleaner cars, even with dirty gasoline. Ford estimates the cost will be \$100 per vehicle. A study conducted for the Manufacturers of Emissions Controls Association provides further evidence that ample technology exists for automakers to meet Tier 2 standards. Researchers at the Southwest Research Institute were able to make adjustments to a 1999 Chevrolet Silverado that allowed it to meet the proposed standard of 0.07 g/mi NO<sub>x</sub> even at 120K miles. This study was conducted using today's technology and today's CA gasoline with 38 ppm sulfur content. Car companies themselves could likely achieve even better reductions with access to the vehicle's proprietary software - access that researchers in the MECA study did not have. Another commenter refers to the Silverado example, and data developed by CA engineers and the Union of Concerned Scientists to document that the standards are feasible.

One of these commenters notes that the Tier 2 NO<sub>x</sub> goals could be achieved even earlier by using continuously variable automatic transmissions, a technology already extensively used by Subaru and DAF, which would allow vehicular power plants to operate within a narrow band of speed and load, achieving the same kind of efficiency currently enjoyed by stationary engines. In addition, the use of hybrid underhood power plants or multi-stage power supplies, incorporating the output from one or more auxiliary motors to supplement the main engine's power during extreme load conditions, allowing even the largest vehicles to operate at substantially greater efficiency throughout their range of speed and load (i.e., Toyota Prius).

MECA notes that it recently completed a demonstration program which provides a further illustration of the types of low emission levels that are achievable. In the program, four vehicles certified to meet the federal Tier I standards were equipped with advanced catalyst technology. The types of engine control and calibration modifications employed during the program are no different than types of modifications vehicle manufacturers would employ when targeting high emission events. The emission control strategies and technologies employed in the test program had no measurable impact on fuel economy and there did not appear to be any change in vehicle performance between the vehicles in their stock condition and after the optimized systems were installed. The MECA test program illustrates the types of control technologies and engine strategies that can be employed to meet the proposed Tier 2 standards. Substantial reductions of both NMOG and NO<sub>x</sub> are achievable and it is not necessary to trade-off NMOG control to achieve low NO<sub>x</sub> emission levels. In part because the thermal durability of three-way catalysts has greatly increased in recent years, it is likely that HLDTs will be able to meet the Tier 2 standards using the same type of technology that will be used for passenger cars. It is also likely that manufacturers will be able to produce diesel powered vehicles that meet the Tier 2 standards, given low sulfur fuel, advanced diesel engines, and exhaust emission controls, such as oxidation catalysts, PM filters, and lean NO<sub>x</sub> controls (SCR, lean NO<sub>x</sub> catalysts and NO<sub>x</sub> adsorbers). MECA provides the report that summarizes their demonstration program as supporting documentation: "MECA Demonstration Program of Advanced Emissions Control Systems for Light Duty Vehicles, Final Report," dated May 1999.

A few commenters add that there is advanced, new technology that is currently available and would allow car manufacturers to immediately reduce emission rates. The GEET fuel pre-treater is a specially designed reaction chamber, which effectively converts both gasoline and diesel as well as crude oil and other fuels to a new fuel that is rich in hydrogen and burns extremely clean. This pre-treater is capable of reducing emissions by

95% and doubling fuel economy. EPA should investigate the possibilities of encouraging or requiring manufacturers to use this type of technology to reduce emissions in the near term.

One commenter also adds that the auto industry is capable of meeting the proposed 0.07 g/mi NO<sub>x</sub> standard as early as model year 2002 or 2003 for all vehicles below 10,000 lbs. A study project conducted at the independent Southwest Research Center for the Manufacturers of Emissions Controls Equipment Association (MECA) replaced the catalyst of a 6,400 lb. Silverado showing 120,000 miles on its odometer with a larger, more efficient converter and other advanced but readily available components. The experiment achieved NO<sub>x</sub> emissions of 0.047 g/mi, more than 30 percent below the proposed Tier 2 standards, using a gasoline with a sulfur content of 38 ppm.

Several of these commenters also argue that vehicles are able to meet the Tier 2 standards without the proposed fuel controls. Refinery interests argue that EPA has not demonstrated, as it is required to do under section 211(c) of the CAA, that the proposed fuel sulfur standards are necessary to avoid significantly impairing the emission control technology that is expected to be in general use in the 2004 vehicle fleet. Test programs have demonstrated that vehicles can be designed with emission control systems that are less sensitive to sulfur and that the effects of sulfur on emissions can be reversed. The Agency must provide a thorough comparison of emission control devices in general use that do and do not require the proposed level of sulfur reduction.

In contrast, auto interests state that the technological feasibility of any significant tightening of the vehicle emission standards is dependent on reducing fuel-sulfur levels. GM provides significant discussion regarding the importance of reducing sulfur levels when evaluating the technological feasibility of vehicles emission reductions. GM includes historical information, data on sulfur levels around the world, and generally refers to studies conducted by the U.S. Auto/Oil Air Quality Improvement Research program (AQIRP), the European Program for Engines, Fuels and Emissions (EPEFE), the AAMA/AIAM Sulfur Test Program, and the Coordinating Research Council (CRC). GM also refers to the "Petition to Regulate Sulfur in Gasoline Under Section 211 (c) of the CAA," AAMA/AIAM, dated 3/19/98 (provided as Attachment B to the GM letter), which includes information, analysis, and recommendations regarding the necessity of low-sulfur gasoline.

Another auto company states that, to meet the Tier 2 standards, catalysts must be able to achieve much higher efficiencies without increasing precious metal content and it will be difficult to predict how durable they will be. The precious metal will be much more highly dispersed in these advanced catalyst designs, which will make them much more susceptible to sulfur poisoning.

Commenters raise other general issues, including that: (1) EPA should ensure that the Tier 2 rule does not result in reduced vehicle driveability and performance; (2) implementation of the Tier 2 standards for HLDTs will require some extra work and technological experimentation; (3) the thermal durability of three-way catalysts typically used on passenger cars, LDT1 and LDT2, has greatly increased in the past five years from 900 to 1100 degrees C. Therefore, this technology can be used to reduce emissions from HLDTs, which typically have higher temperatures; (4) the technology breakthroughs spurred by light duty standards could eventually be transferred to the heavy-duty engine line (i.e. greater than 8,500 lbs); and (5) the technology to meet the California LEV II VOC limit is currently available.

**Commenters: American Honda Motor Co. (IV-F-48), American Petroleum Institute (IV-D-114), p. 112, Bell, S. (IV-F-89), California Air Resources Board (IV-D-271), p. 1, California Air Resources Board (IV-F-126), Clean Air Conservancy (IV-F-75),**

Environmental Defense Fund (IV-D-174), p. 13, General Motors Corporation (IV-D-209), vol. 1, p. 36-38, vol. 3, p. 1-13, Giant Industries, Inc. (IV-D-66), p. 1, Giant Industries (IV-D-92), p. 1, Global Environmental Energy Technology (Philadelphia - Day 2) (IV-F-131), Global Environmental Energy Technology (IV-F-850), Holding, Cory (IV-F-845), International Center for Technology Assessment (IV-D-122), p. 4, League of Women Voters (IV-D-213), Manufacturers of Emission Controls Association (IV-D-164), all pages, Manufacturers of Emission Controls Association (IV-D-64), p. 1-3, Manufacturers of Emission Controls Association (IV-F-39), Marathon Ashland Petroleum LLC (IV-D-81), p. 49, Navistar International Transportation Corporation (IV-F-12), Ohio Public Interest Research Group (IV-F-98), Pennsylvania Automotive Association (Philadelphia - Day 1) (IV-F-131), Pennsylvania Coalition for Vehicle Choice (IV-F-46), Plant, T. (IV-F-60), SC Department of Health and Environmental Control (IV-D-56), p. 2, Sierra Club (IV-F-14), Sierra Club, Northeast Ohio Group (IV-F-103), Tesoro Northwest Company (IV-D-91), Texas Fund for Energy and Environmental Education (IV-D-87), Union of Concerned Scientists (IV-D-195), p. 1), U.S. Public Interest Research Group (Atlanta) (IV-F-132)

**RESPONSE:** As stated previously in this document, we believe that the technology improvements needed to meet the standards are well understood and that much, if not all, of the development needed to meet the standards will be in the areas of optimizing emissions control systems and calibrations in conjunction with the use of low sulfur fuel. One of the basic tenets of this rule has been to treat vehicles and fuels as a single system. Between a preponderance of vehicles certified to emission levels at/or below the Tier 2 standards and data from several vehicle feasibility test programs, we believe that we have presented a significant amount of data supporting the feasibility of the standards. A number of commenters supported our determinations of technological feasibility and need for low sulfur gasoline.

One commenter, however, argued that vehicles should be able to meet Tier 2 standards without the implementation of low sulfur fuel requirements. While it is true that the effect of operation on high sulfur fuel on emissions varied between vehicles, the average impact of sulfur on emissions was very high. The increase in emissions from 30 ppm sulfur gasoline to 330 ppm sulfur gasoline was, on average, 100 percent for NMHC and 197 percent for NO<sub>x</sub> emissions. These are significant increases that are far more relevant than the emission variability among vehicles. The data and information presented by API on the ability to design emission control systems that are less sensitive to sulfur was not comprehensive enough (or cost-effective), to convince us that vehicles and fuel should not be treated as a single system. For example, API's main argument for developing sulfur tolerant vehicles was to increase catalyst precious metal loading. With the increased demand in palladium and rhodium for NLEV, as well as LEV-II and Tier 2, precious metal costs have been increasing. Additional use of precious metals would only increase the demand and, therefore, the cost for precious metals. In addition, the use of additional precious metals does not ensure that such catalysts will not be as susceptible to sulfur poisoning, or be even more susceptible, thus endangering emission reductions potential from such an approach.

In regards to establishing technological feasibility for HLDTs, we refer the reader to Chapter 4 of the RIA. We have done extensive testing on several HLDTs at NVFEL and also at SwRI. The results of all of the testing suggest that HLDTs will be capable of meeting the Tier 2 standards in a cost-effective manner with considerable compliance margins. One of the vehicles tested was a 1999 Ford Expedition (LDT4). We not only made modifications to the catalyst system for this vehicle, but we were able to optimize the emission calibration. We were able to modify the emission calibration in a manner that allowed us to operate the vehicle on the road as well as in the test cell. We monitored the vehicle for any deterioration in driveability or performance and found none. As stated

above, an extensive description of our HLDT test program can be found in Chapter 4 of the RIA.

**COMMENT G:** If and when new technologies are developed (i.e., technologies currently unknown), the Tier 2 rule should allow for the promulgation and implementation of more stringent standards beyond those presently under consideration. **(Campaign on Auto Pollution (IV-F-44))**

**RESPONSE:** We believe the Tier 2 standards being promulgated are appropriate for the technologies that will be in effect in 2007. We believe that our Tier 2 rulemaking will lead to substantial, cost effective reductions in NO<sub>x</sub> emissions. Our Tier 2 rulemaking does not constrain us from reducing NO<sub>x</sub> emission standards further at some future date subject to relevant statutory requirements such as leadtime in the Clean Air Act.

**COMMENT J:** EPA must determine technological feasibility for heavier vehicles separately from lighter vehicles. AAM notes that the CAA explicitly requires EPA to treat vehicles weighing more than 6,000 lbs GVWR differently from those weighing less. To support their assertion, AAM references CAA section 202(b)(3)(C) - definition of 'heavy duty vehicle,' and also refers to provisions within the following sections that identify this category as "light-duty truck": 202(d), 202(h), 202(j)(2), and 207(c)(4)(B)(ii). AAM notes that CAA section 202(i) grants no authority to regulate vehicles weighing more than 6,000 lbs. GVWR, and specifically references several subsections within 202(i). AAM references the following sections relating to useful life, cold CO emissions and in-use compliance as further evidence that Congress intended EPA to address these heavier vehicles separately: 202(d)(1), 202(d)(2), 202(j)(2), 207(c)(4) and 207(c)(5). AAM also references NRDC v. Costle, 655 F.2d 318, 322 (D.C. Cir. 1981) ("Particulate Traps") and International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 639 (D.C. Cir. 1973) to further support their position on this issue. Using existing emission control technology, the Tier 2 standards are not feasible for diesel engine vehicles, even with very low sulfur fuel. If EPA requires very low sulfur diesel fuel, diesel engine manufacturers will face serious problems meeting the Tier 2 standards. Also, EPA does not appear to have considered a compliance margin for diesel engine vehicles as EPA did for gasoline vehicles. Moreover, commenter disagrees that the interim standards can be met with current diesel fuel sulfur levels. Increased use of EGR to meet those standards will require reduced sulfur fuel. **(Alliance of Automobile Manufacturers (IV-D-115), p. 10-11, 72-73), Engine Manufacturers Association (IV-D-71), p. 12-13)**

**RESPONSE:** Please refer to responses to Issues 2.1.2, 26.1.M, and 26.1.O.

**COMMENTS M, N, O, T:** A few commenters state that light duty diesels may be able to achieve the Tier 2 targets assuming low-sulfur diesel fuel is readily available. Detroit Diesel provides additional discussion and data regarding the feasibility of meeting the standards given current technology. DDC anticipates a high degree of reliance on aftertreatment and has been testing the DELTA engine with an experimental CRT in the exhaust system. The CRT has demonstrated over 90% effectiveness in trapping PM. By adjusting the engine calibration to reduce NO<sub>x</sub>, tailpipe emission levels of 0.66 g/mi NO<sub>x</sub> and 0.024 g/mi PM have been demonstrated. NO<sub>x</sub> aftertreatment will be added to the vehicle in the near future. The particulate and NO<sub>x</sub> aftertreatment systems are sensitive to sulfur and require near zero sulfur fuel to function effectively and durably.

In the case of diesel direct injection, there are some significant environmental benefits such

as low NMOG, CO, cold-start, evaporative, and refueling emissions. However, these lean-burn technologies present difficult emission control challenges. Current technology will not allow for diesel direct injection to achieve the proposed standards.

With respect to diesel engines, a commenter also notes that systems capable of at least 50 percent NO<sub>x</sub> reductions will be available in time for implementation of the Tier 2 standards. PM aftertreatment systems such as catalyzed soot filters may achieve 80 percent or greater trapping efficiency. However, these reductions still result in emissions that exceed the standards in Bin 7. Finally, one commenter states that in order to ensure that diesel powered vehicles meet the proposed standards, the vehicle technology for these vehicles and the sulfur content of diesel fuel must be improved simultaneously.

**Commenters:** Cummins Engine Company (Atlanta) (IV-F-132), Cummins Engine Company, Inc. (IV-F-32), Detroit Diesel Corporation (IV-D-52), p. 1-2, 5, (Navistar International Transportation Corporation (IV-F-12), Navistar International Transportation Corporation (Atlanta) (IV-F-132), Volkswagen of America, Inc. (IV-F-54), Volkswagen of America, Inc. (IV-D-60), p. 4-6 (See other letters listed under Comments N.1-N.3, below)

**RESPONSE:** We believe that the Tier 2 standards are feasible for diesel-equipped light-duty vehicles and trucks considering the flexibilities in the final rule with respect to lead-time, interim standards, phase-in structure, if lower sulfur diesel fuel is made available. We recognize that reductions in diesel fuel sulfur sufficient to enable effective PM and NO<sub>x</sub> aftertreatment, such as advanced PM traps and NO<sub>x</sub> adsorption catalysts, will be necessary for diesel engines to meet the final Tier 2 standards. Both Ford and AAM have provided data to the docket documenting NO<sub>x</sub> aftertreatment under lean exhaust conditions that is 70 to 85% efficient when used with very low sulfur diesel fuels. Similarly, data for PM traps provided by Ford and MECA has demonstrated PM reductions from 80% to greater than 90% when used with such fuels. A separate rulemaking process, initiated with the Diesel Fuel ANPRM, will address diesel fuel sulfur levels prior to full implementation of the final Tier 2 standards.

In the period leading up to the introduction of lower sulfur diesel fuels, Tier 2 Interim Standards will be in place that are achievable through the use of currently available or near term engine and exhaust aftertreatment technologies<sup>10</sup>. These technologies include the use of advanced fuel systems (e.g., as electronically controlled, high-pressure common rail fuel systems) and cooled EGR to achieve low engine-out NO<sub>x</sub> and PM levels, along with the use of conventional diesel exhaust aftertreatment such as diesel oxidation catalysts and/or near-term NO<sub>x</sub> reduction technology such as precious-metal-based lean-NO<sub>x</sub> catalysts.

**COMMENT N.1:** The Tier 2 proposal will penalize, and essentially prohibit altogether, the use of promising new fuel-efficient, direct-injection and lean-burn technologies. The result of this penalty will be to limit gains in fuel economy that could otherwise have been achieved. Three methods have been studied as possible technologies to reduce NO<sub>x</sub> emissions from lean-burn engines: SCR systems using HC as reductants, SCR systems using urea as a reductant, and lean NO<sub>x</sub> adsorbers. However, all of these systems have limitations: SCR systems that use HC fail to convert a sufficient amount of NO<sub>x</sub> into other compounds, urea SCR systems have limitations related to size of the system and their tendency to emit ammonia, and lean NO<sub>x</sub> adsorbers are not capable of reducing NO<sub>x</sub> emissions to the levels required to achieve the Tier 2 standards. GM cites to: Particulate Traps, 655 F.2d at 333; and Austin & Lyons, Analysis of Compliance Feasibility under

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<sup>10</sup> "Cummins Sees Diesel Feasible for Early Years of Tier 2". Hart Diesel Fuel News, Sept. 20, 1999, p.2.



Proposed Tier 2 Emission Standards for Passenger Cars and Light Trucks, Sierra Research, dated July 1999. **(General Motors Corporation (IV-D-209), vol. 1, p. 5, 49-51)**

**RESPONSE:** We recognize that the narrow temperature window within which HC-SCR systems have their highest NO<sub>x</sub> conversion is not currently sufficient to meet the final Tier 2 Standards. However, their NO<sub>x</sub> reduction efficiency should be high enough, when used in combination with advanced engine technologies, to allow diesels to meet the Tier 2 Interim Standards. Future development of such systems may further improve their NO<sub>x</sub> conversion efficiency. Urea SCR and NO<sub>x</sub> adsorber systems have demonstrated NO<sub>x</sub> reduction efficiencies that would be consistent with the levels necessary for diesel equipped vehicles and trucks to meet the Tier 2 Standards, particularly considering the lead time available for further development of these systems. Considerable progress has been made in recent years with urea-SCR to reduce urea consumption, reduce catalyst volume, and to reduce ammonia slip via improved control systems and the use of oxidizing "clean-up" catalysts.

**COMMENT N.2:** As an example of the potential environmental benefits of diesel engines, the intensive process used by the government and industry participants in the Partnership for a New Generation of Vehicles (PNGV) project has determined that four-stroke direct injection is the most promising near-term technology for meeting PNGV fuel economy goals. EPA's proposal could effectively prevent the PNGV program from being broadly implemented and thus restrict their usefulness in meeting future energy efficiency targets. **(Alliance of Automobile Manufacturers (Cleveland) (IV-F-134), Engine Manufacturers Association (IV-D-71), p. 7-8, Volkswagen of America, Inc. (IV-D-60), p. 4-6)**

**RESPONSE:** EPA strongly believes that the Tier 2 regulations will not effectively prevent the Partnership for a New Generation of Vehicles (PNGV) program from being broadly implemented. To the contrary, EPA believes the Tier 2 regulations are completely consistent with the underlying goals and history of the PNGV program.

PNGV grew out of a government initiative originally called the Clean Car Initiative, the overriding goal of which was to simultaneously reduce both greenhouse gas and criteria emissions. The original PNGV press document specifically laid out "a vision of technology that can produce competitively priced, high-performance, *low-pollution*, safe vehicles. This partnership focuses government and industry research efforts on the development of technological improvements *that could meet ambitious pollution and safety standards* in a vehicle that would preserve all the features Americans expect from automobiles and light trucks." (*A New Partnership for Cars of the Future, September 29, 1993, italics added*) This mutual environmental mission of developing technologies that could simultaneously address both greenhouse gas and criteria emissions was also directly reflected in the PNGV Declaration of Intent, the guiding document of PNGV, which specifically included as a primary program goal to "reduce criteria pollutants to Tier II emission levels." (*PNGV: A Declaration of Intent, September 29, 1993*) Although the Tier 2 rulemaking was still several years away, the Clean Air Act had suggested a 0.2 gram per mile NO<sub>x</sub> "default value" for light-duty vehicles, a value which was formally adopted as a PNGV goal early in the program. Subsequently, PNGV also adopted a 0.01 gram per mile stretch research objective for particulate matter.

Tier 2 establishes emission standards for all passenger cars and light-duty trucks, while the current PNGV program involves only midsize family sedans. As discussed elsewhere in this document, we strongly believe that gasoline-fueled, conventional technology vehicles will have no difficulties meeting the Tier 2 standards. While the intent of the Clean Air Act was to ensure that all vehicles, regardless of fuel or technology, would meet the Tier 2 standards by 2004, EPA has included in Tier 2 several flexibilities to accommodate the development of new technologies such as advanced high-efficiency and lean burn engines

that have the potential for lower greenhouse gas emissions. The most important of these flexibilities are the multiple bins that permit NO<sub>x</sub> averaging and the phase-in periods that do not require all vehicles to meet the ultimate Tier 2 levels until 2007 or 2009. It is only in 2007 for LDVs and LLDTs and 2009 for HLDTs that all vehicles will have to meet levels no higher than 0.2 gram per mile NO<sub>x</sub>, the longtime PNGV NO<sub>x</sub> goal, and 0.02 gram per mile particulate matter, twice the current PNGV particulate stretch research objective. Prior to 2009, some vehicles can be certified to much higher NO<sub>x</sub> and particulate matter emission levels.

**COMMENT N.3:** At the present time, technology has not been developed to allow diesel vehicles to meet the proposed NO<sub>x</sub> and PM standards. Small displacement diesel engines (i.e. under 2.0 liters) in relatively light-weight vehicles equipped with manual transmissions may only be capable of approaching PM standards which are approximately 50 percent higher than the least stringent Tier 2 PM standards of 0.02 g/mi using conventional control measures. The application of these control measures is also of importance for concurrent reduction of NO<sub>x</sub> levels from diesel engines. The proposed PM standards would preclude the certification of even small diesel vehicles using conventional control measures. Further reductions in PM would require the installation of after-treatment control devices such as a particulate trap. The reductions that could be achieved using these devices are still being investigated. Using the small diesel engines as an example, PM trap technology with efficiencies of 80 percent would be required to approach the levels of PM reduction required by the proposed Tier 2 emission standards. **(Volkswagen of America, Inc. (IV-D-60), p. 4-6)**

**RESPONSE:** We agree that the final Tier 2 PM standard is not achievable on diesel vehicles through the use of "conventional" engine control measures. It will likely require the use of PM exhaust aftertreatment, such as the use of a catalyzed PM trap or a combination of a precious-metal catalyst to produce NO<sub>2</sub> for soot oxidation together with a PM trap. In many previous rulemakings we have established emissions standards that are technology forcing. For example, Tier 0 and Tier 1 light-duty emissions standards have forced spark ignition engines away from the use of "conventional control measures" to the use of modern three-way catalytic converters with closed-loop fuel system control, which have resulted in emissions reductions of 90% or greater for NO<sub>x</sub>, CO, and hydrocarbons.

**COMMENT Q:** Light duty diesels may be able to meet the Tier 2 targets assuming an ultra-low sulfur diesel fuel, elimination of the intermediate (50K) useful life standards, expansion of the bin and credit proposals, and a later phase-in date for HLDTs. Navistar provides additional discussion regarding this issue. Navistar cites to the following to support their position that a vehicle emissions regulation will fail on technology infeasibility grounds if it effectively eliminates a class or category of automobile from the marketplace: CAA Sections 202(a) and (i); *International Harvester Co., V. Ruckelshaus*, 478 F.2d 615 (D.C. Cir. 1973); and *Natural Resources Defense Council v. EPA*, 655 F. 2d 318 (D.C. Cir. 1981). Navistar also cites to the following to emphasize that under the CAA, it was Congress' intent that EPA distinguish between gasoline and diesel engines when establishing new emissions standards: CAA Sections 202(g), (h), and (i); *Gustafson v. Alloyd Co.*, 115 S. Ct. 1061, 1067 (1995); *Deal v. United States*, 113 S. Ct. 1993, 1996 (1993). The 1990 CAA Amendments along with applicable judicial precedents, establish that EPA may not establish emissions standards that effectively eliminate an entire class of vehicle, that light duty diesel represents a distinct class of vehicle, and that any emissions standards which apply to light-duty diesel vehicles must be premised upon administrative findings that such standards are technologically feasible for light duty diesels. **(Navistar International Transportation Corp. (IV-D-50), p. 4-5, 24-26)**

**RESPONSE:** We agree that the final Tier 2 standards will be feasible for diesel engines

operating on low-sulfur diesel fuel, though we do not believe that the other criteria discussed by the commenter would be necessary for feasibility - nor has the commenter provided data to show that the other listed items would be necessary for feasibility. We further believe, as discussed elsewhere, that the interim standards are feasible for diesel vehicles even given current sulfur levels in diesel fuel. EPA is currently reviewing in a separate proceeding whether it is appropriate to promulgate requirements for lower sulfur in diesel fuel.

Regarding the requirements of the Clean Air Act, as discussed in several places in this document, (see e.g. Issue 2.1.3.) the Act does not require that EPA provide separate feasibility showing for every subclass of engines subject to the standards. As noted in American Harvester, "as long as feasible technology permits the demand for new passenger automobiles to be generally met, the basic requirements of the Act would be satisfied, even though this might occasion fewer models and a more limited choice of engine types. The driving preferences of hot rodders are not to outweigh the goal of a clean environment." Nor does the desire of some manufacturers to build higher-polluting diesel engines outweigh the goal of a clean environment. EPA has found that these standards are technologically feasible for vehicles representing over 99 percent of the current fleet. EPA has also found that having different standards for diesel engines would create a substantial risk that manufacturers would greatly increase their production of diesel engines, which would substantially undermine the emission reductions needed from the Tier 2 program.

Regarding the specific language in section 202, neither section 202(i) or 202(a) require EPA to review diesel engines separately from gasoline engines. In fact, the default standards under section 202(i) do not contemplate any differences for diesels. The commenter notes that under sections 202(g) and 202(h), Congress provided some relief for diesel-fueled vehicles from the Tier 1 LDV/LDT NO<sub>x</sub> standards. However, such relief was not required under section 202(i) or section 202(a). Moreover, even in those subsections, the relief either ended as of 2003 or applied only to the intermediate standards, not the full useful life standards.

**COMMENT R:** The CAA requires EPA to consider diesel fuel quality in evaluating the technological feasibility of diesel vehicles meeting the vehicles emission standards proposed in the Tier 2 rulemaking. Some of the commenters argue that EPA's failure to perform an independent analysis of this factor for diesel-powered vehicles is inconsistent with section 202(i) of the CAA. EPA proposed the Tier 2 NO<sub>x</sub> and PM standards for diesel-powered vehicles based solely on feasibility and cost-effectiveness studies of those standards for gasoline vehicles. EPA must accompany its proposed emissions limits for diesel vehicles with regulations mandating cleaner diesel fuel for the same reasons that EPA is linking the feasibility of the Tier 2 rules for gasoline engines to the availability of low sulfur gasoline. Despite its promise to examine diesel tailpipe emission standards through section 202 criteria, EPA relied solely upon feasibility and cost-effectiveness analyses of gasoline engines when it developed and issued the Tier 2 proposal. Also, EPA has failed to verify the feasibility of its proposed diesel emissions standards, in violation of the CAA. Unless EPA corrects this error in the final rule, the Tier 2 standards are vulnerable to challenge in the Court of Appeals. It is critical that EPA conduct a "needs" determination to demonstrate that there is, or will be, a continuing need to achieve emission reductions beyond the Tier 2 requirements for gasoline powered vehicles. The Agency must show that requiring diesel powered vehicles to meet the same standard is an appropriate alternative. In light of the relatively insignificant percentage of diesel powered light duty vehicles and trucks on the road, compared to automobiles, the environmental benefits from imposing Tier 2 standards on diesel engines will be very small. Finally, the Agency can not rely on its gasoline based Tier 2 economic analysis to justify extending these requirements

to diesel powered vehicles. The technology, costs, and fuel production characteristics for diesel vehicles and fuels is so fundamentally different that an independent analysis is required. Another commenter raises similar arguments. **(Alliance of Automobile Manufacturers (IV-D-115), p. 13-18), Marathon Ashland Petroleum LLC (IV-D-81), p. 25, 65-66, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 9-10), U.S. Chamber of Commerce (IV-D-142), p. 6-7)**

**RESPONSE:** EPA has promulgated its Tier 2 requirements viewing diesel and gasoline vehicles and trucks in the same category. As discussed in depth in section 2.1.3. of this document, given the fact that diesel vehicles have historically been a very small part of this market and that diesel vehicles in this class of vehicles have not been used for different functions than gasoline vehicles in this class, it is reasonable for us to review the feasibility, need and cost issues for this regulation looking at these vehicles as one class. This is especially true because creating special rules for diesel vehicles could result in substantial increases in emissions caused by vehicle manufacturers producing more diesel vehicles to take advantage of less stringent standards. Nothing in section 202 of the Act requires that we review diesel engines separately from gasoline engines.

**COMMENT S:** EPA has failed to consider the energy impacts of the Tier 2 proposal in the context of evaluating the availability of technology. Section 202(i) expressly requires consideration of energy impacts and requires EPA to determine whether there is a need for further reductions in emission as provided in section 202(i)(2)(A). That section directs EPA to examine "the availability of technology... for meeting more stringent emission standards.... including the lead time and safety and energy impacts of meeting more stringent emissions standards...." In addition, section 202(b)(1)(C) provides that when EPA revises emissions standards under section 202(a)(1), it must consider "costs, energy, and safety.." See also sections 202(a)(3)(A)(i), (a)(4)(A), and (a)(4)(B). EPA has done nothing to discharge its statutory responsibility to consider these factors. GM also cites Ethyl Corp. v. EPA, 51 F.3d 1053, 1060 (D.C. Cir. 1995) and Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 42-43 (1983) **(General Motors Corporation (IV-D-209), vol. 1, p. 47-49)**

**RESPONSE:** The commenter stated that EPA ignored the requirements of Section 202(i) which requires us to examine "the availability of technology... for meeting more stringent emission standards... including the lead time and safety and energy impacts of meeting more stringent emissions standards..." We disagree with the comment. We are providing more than adequate lead time for our Tier 2 emissions standards. Light-duty vehicles and trucks have until 2007, while heavy-light-duty trucks have until 2009 to fully comply with the standards. That's a lead time of seven and nine years, respectively.

We have considered energy impacts in full with respect to the fuel program and the energy impacts of gasoline desulfurization. Likewise, we see no real energy impacts with respect to the vehicle program. The technologies needed for conventional gasoline engines to meet the Tier 2 standards should have no significant effect on fuel economy for those engines, which represent over 99 percent of the current light-duty fleets. Similarly, EPA does not believe that the stringent Tier 2 emission standards will preclude promising fuel efficient technologies. As evidence of this belief, we point to the recent certification of the Honda Insight, a gasoline electric hybrid vehicle, with a combined fuel economy of 65 mpg [Model Year 2000 Fuel Economy Guide at [www.fueleconomy.gov](http://www.fueleconomy.gov)]. We are also aware of plans by Toyota to certify their Prius vehicle in the near future. The Toyota Prius is also a gasoline electric hybrid vehicle, with fuel economy expected to be well over 50 mpg.

The energy impacts of the vehicle program are driven by the CAFE standards. Without an increase in the CAFE standards, there is no reason to believe that vehicles using more fuel

efficient technologies will lead to increased average fuel economy given that the current CAFE standards are being met with gasoline spark-ignition technology. Even if more fuel efficient technologies were introduced, we believe that their fuel economy benefits are likely to be offset by larger, less fuel efficient vehicles, leading to no increase in overall fleet fuel efficiency. If true, the net effect on a manufacturer's CAFE could be zero. As a result, the introduction of those technologies would have no energy impact.

Finally, none of the technologies and strategies that will be employed in meeting our Tier 2 emission standards will pose any safety concerns. All of the technologies and strategies that will be used are existing proven technologies that have historically been shown to be safe.

**COMMENT U:** The PremAir catalyst would provide significant air quality benefits. EPA should allow manufacturers to use and receive credit for the application of this technology in complying with the Tier 2 emission standards. The PremAir catalyst (developed by Engelhard) directly reduces ozone pollution from the ambient air. This new technology involves coating the surface of a heat exchanger, such as an automotive radiator, so that the ozone in the ambient air that passes across and through the heat exchanger is converted to oxygen. By operating at near-ambient temperatures and utilizing heat-exchange systems associated with "streams" of large quantities of ambient air for other purposes (e.g. dissipating heat), the technology offers a new opportunity to reduce the public's exposure to unhealthy levels of ozone. Because of the potential air quality benefits of the PremAir catalyst when applied to motor vehicle radiators, CARB decided in November 1998 to allow automobile manufacturers to receive credit for applications of this technology in complying with the LEV program requirements. In their comment letter, Engelhard provides a significant amount of discussion, analysis, modeling data and recommendations regarding this issue. Engelhard also provides the following documents as supporting documentation: The Effects of Application of the PremAir Catalyst on Ozone Levels in Urban Areas - Final Report, ICF Consulting, dated July 1999; Estimation of the Effects of a Vehicle-Based Ozone Scavenging Process on Ambient Concentrations, ICF Kaiser - Systems Applications International, dated August 1998; and Estimation of the Effects of an Ozone Control Strategy Focusing on Air Conditioning-Bound Catalysts for Ozone Scrubbing, ICF Kaiser - Systems Applications International, dated February 1998. **(Engelhard Corporation (IV-D-208), all pages)**

**RESPONSE:** To support their recommended 0.015 g/mi credit, Englehard submitted an extensive set of ozone modeling results for five cities (Los Angeles, Houston, Atlanta, New York City, and Chicago). Englehard compared the ozone benefits of Premair to those resulting from NMOG and/or NO<sub>x</sub> emission reductions from motor vehicles. Englehard first determined Premair's ozone benefit as a fraction of the ozone benefit of the reduction in motor vehicle emissions. Englehard then divided the NMOG and NO<sub>x</sub> emission reductions by the total VMT in the area being modeled to determine the g/mi reduction in NMOG and NO<sub>x</sub> emissions which were equivalent to the overall NMOG and NO<sub>x</sub> tonnage reductions. Finally, Englehard multiplied these g/mi NMOG and NO<sub>x</sub> emission reductions by Premair's fractional ozone benefit to determine the equivalent g/mi NMOG or NO<sub>x</sub> emission reductions achieved by Premair.

In determining ozone benefits, Englehard evaluated a number of possible indicators of ozone-related air quality. They evaluated the peak 1-hour and 8-hour ozone levels occurring anywhere within the area being modeled on each day of the episode being modeled. They also evaluated total ozone exposure defined in a number of ways:

1. person-hours exposed to ozone levels above either the 1-hour or 8-hour ozone NAAQS,

2. person-ppm-hours, which is the same as person-hours exposed to ozone levels above either of the two NAAQS, except that each hour of exposure is multiplied by the level of the ozone occurring at that point in space and time, as long as the ozone level is above the applicable NAAQS,
3. km<sup>2</sup>-hours, which is the sum of the area inside of the modeled area during each hour which is projected to have an ozone level above either the 1-hour or 8-hour NAAQS, and
4. km<sup>2</sup>-ppm-hours, which is the sum of the area inside of the modeled area during each hour which is projected to have an ozone level above either the 1-hour or 8-hour NAAQS multiplied by the projected ozone level, as long as the ozone level is above the applicable NAAQS.

The equivalent Premair credit in terms of g/mi NMOG, NO<sub>x</sub> or NMOG+NO<sub>x</sub> varied dramatically depending on which ozone air quality indicator was used. In particular, no NO<sub>x</sub> credit could be determined in a number of cases, as the modeled NO<sub>x</sub> emission reduction caused the ozone indicator to increase rather than decrease. In some cases, the implied credit was well above 0.015 g/mi, while in others, the implied credit was well below that figure. Englehard based its recommended on Premair's relative impact on the peak daily 1-hour ozone level.

In evaluating the equivalent NMOG and/or NO<sub>x</sub> emission credit associated with use of Premair, the evaluation can be divided into four broad areas. The first is the impact of Premair on ozone levels in the atmosphere immediately surrounding the vehicle. This impact is a function of the design of the Premair system. The second is the relationship between the ozone concentration immediately around vehicles and that in the surrounding ground level atmosphere. Differences in these two ozone levels occurs because the impact of vehicular NO<sub>x</sub> emissions on ambient ozone in the immediate vicinity of the vehicle. The third is the impact of motor vehicle NMOG and NO<sub>x</sub> emission reductions on ozone. Issues involved with each of these three aspects of Premair effectiveness are discussed below in order. The fourth is the way that the credit is incorporated into the certification requirements for Tier 2 standards.

#### **Premair Performance on the Vehicle**

Englehard has identified the key factors which determine Premair's effectiveness. These factors are:

1. its catalytic ozone removal efficiency, as a function of vehicle speed;
2. the durability of this ozone removal efficiency, as a function of vehicle mileage;
3. the area of the radiator; and
4. air flow through the radiator as a function of vehicle speed, including at idle.

Englehard projected values for each of these factors in conducting its ozone modeling. However, Englehard recommended that manufacturers certifying Premair demonstrate these key factors through an extensive testing program. EPA agrees and will require that manufacturers demonstrate these performance factors for each application which they plan to certify.

#### **Impact of Vehicular NO<sub>x</sub> Emissions on Ozone Levels Near Vehicles**

Premair can only remove ozone in the atmosphere which passes through the radiator. It is well known that NO<sub>x</sub> emissions decrease ozone in the area immediately near the emission. This occurs because NO<sub>x</sub> reacts with the OH<sup>-</sup> radical, which is a key proponent of the

reactions producing ozone.

Englehard presents the results of a study performed in Cincinnati which indicates that motor vehicle NO<sub>x</sub> emissions reduce ozone immediately around the roadway by about 40% relative to ozone levels generally existing in the area. Englehard also states that problems with ozone measurements may have caused this reduction to be overestimated and that it might be only 20-30%. It appears that this factor is still somewhat uncertain.

In its ozone modeling of the four out of the five cities, Englehard states that they used the above 40% reduction factor. However, in modeling Atlanta, Englehard used a fixed reduction of 30 ppb. Englehard states that they believe that this fixed ozone reduction is more appropriate than the relative reduction factor. However, the rationale behind this is not clear.

While Englehard's formal comments imply that the 40% factor was used in four out of the five cities, the supporting documentation by Environ (who performed the modeling) indicates that this factor was not used in the actual ozone modeling. Environ states that the 40% reduction factor is indicative of the impact of roadway NO<sub>x</sub> emissions on ozone in 1994, when the Cincinnati study was performed. However, over time, NO<sub>x</sub> emissions are decreasing and Environ projects that the ozone reduction will decrease, as well. In later years (e.g., 2000, 2010), Environ used lower reductions of 20-32%. These reductions in the NO<sub>x</sub> reduction factor were based on the projection of lower NO<sub>x</sub> emissions from future model year vehicles relative to those implicit in the Cincinnati study, assuming that the ozone reduction was linear with NO<sub>x</sub> emission level.

The details behind Environ's projection of in-use NO<sub>x</sub> emissions were not presented. Further evaluation is required to determine their appropriateness. In particular, it is unlikely that Environ considered the changes to MOBILE5 which were incorporated into the Tier 2 model in support of this rule. Also, Environ appears to be equating motor vehicle NO<sub>x</sub> emissions in Cincinnati and the other five cities in 1994. However, differences in I/M program and other local factors may be affecting emissions and should be considered. Overall, EPA believes that it is premature to project an ozone reduction factor solely on the information provided to date.

### **Impact of NMOG and NO<sub>x</sub> Emission Reductions on Ambient Ozone**

As mentioned above, Englehard submitted an extensive set of ozone modeling results for five cities (Los Angeles, Houston, Atlanta, New York City, and Chicago). In reviewing the details of ozone modeling, we have identified several significant issues which could affect the ozone benefit of NMOG and NO<sub>x</sub> emission reductions, and therefore, the NMOG and/or NO<sub>x</sub> emission credit assigned to Premair.

The first issue pertains to the base NMOG and NO<sub>x</sub> emission inventories used in the modeling. The response of ozone to NMOG and NO<sub>x</sub> emission reductions is a strong function of the ratio of the base ambient NMOG and NO<sub>x</sub> levels in the atmosphere. By necessity, none of the inventories reflects the important revisions made to mobile source emission projections made in support of the NPRM. These include revisions to LDV/LDT emissions, HDV emissions, particularly vehicles powered by diesel engines, and nonroad equipment. Essentially all of these revisions cause NMOG and NO<sub>x</sub> emissions in the 2000 timeframe to increase, though the increase is much more significant for NO<sub>x</sub> emissions than NMOG emissions. The changes are less significant in 2010, except for nonroad equipment. Thus, the base ambient levels of NMOG and NO<sub>x</sub> implicit in the ozone modeling submitted by Englehard likely differ dramatically from those that would result from updated emission inventories. The issue is how the response of ozone to NMOG and NO<sub>x</sub> emission reductions would change based on these update emission inventories.

The ozone modeling submitted by Englehard indicated that peak 1-hr ozone levels were more sensitive to NO<sub>x</sub> emission reductions than NMOG emission reductions in Atlanta, while the opposite was true in New York City<sup>11</sup>, Chicago, and Houston. (NO<sub>x</sub> emission reductions were not evaluated in Los Angeles.) In contrast, EPA's own ozone modeling performed in support of the Tier 2 rule indicates that ozone in the vast majority of the nation is more responsive to NO<sub>x</sub> emission reductions than to NMOG emission reductions. However, our modeling also indicates that there are areas where ozone levels are more sensitive to NMOG emission reductions than NO<sub>x</sub> emission reductions and these areas tend to be inside of certain major metropolitan areas such as New York City, Chicago, Detroit and Houston. Thus, there is general consistency between the ozone modeling submitted by Englehard and that performed by EPA. However, since the ozone modeling submitted by Englehard only addresses 5 metropolitan areas, the benefits of NO<sub>x</sub> emission reductions are skewed to the negative relative to the nation as a whole. Thus, one issue is the geographical area over which the relative ozone benefits of Premair should be determined.

In contrast, ozone modeling in all five cities indicated that NMOG emission reductions were effective in reducing peak 1-hour ozone. Therefore, the available modeling could potentially be used to support a NMOG credit for Premair. Englehard shows that the available modeling indicates that Premair is equivalent to a NMOG reduction of 0.007-0.016 g/mi on the peak ozone days of the various ozone episodes. Thus, the 0.015 g/mi credit proposed by Englehard is near the upper end of this range. On days of lower peak ozone levels, the equivalent NMOG reduction is both well below this range, as well as somewhat above it.

The second issue related to interpreting the ozone modeling is the determination of the change in vehicle emission standards which would produce the in-use emissions modeled in the five cities. The modeling cited by Englehard presumably used either MOBILE5 or California's EMFAC models to project in-use emissions from motor vehicles. First, Englehard used differences in the Tier 1 and TLEV 50,000-mile emission standards to estimate the Premair credit. While it would be useful to manufacturers to have a credit towards the Tier 2 50,000 mile standards, the primary Tier 2 standards are the full-life, 120,000 mile standards, as these are used in the comparison to the corporate average NO<sub>x</sub> standards. Thus, the equivalency calculations should at least be extended to the 120,000 mile standards. Also, and more importantly, these emission models used by Englehard do not incorporate the important changes to emission modeling included in the Tier 2 emission model, which was developed for this rule.

ARB recently issue a Manufacturers Advisory Correspondence (December 20, 1999) which establishes procedures for the certification of direct ozone reducing devices, such as PremAir. In their MAC, ARB will be performing new ozone modeling to establish the appropriate NMOG credit for the generic direct ozone reducing system. Given the above concerns about the ozone modeling which has been performed to date, we believe that new modeling should be performed for areas outside of California, as well.

#### **Method Used to Incorporate Premair Credit in Vehicle Certification**

The primary issue in this area is whether the credit should be applied when certifying a vehicle to a specific bin, or as an adjustment to the corporate average NO<sub>x</sub> emission level. In the former situation, the credit could be used to help a vehicle comply to a more

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<sup>11</sup> Englehard indicates that ozone is more responsive to NO<sub>x</sub> than NMOG on July 11 in New York. However, this does not seem to be borne out by the detailed modeling results present by Environ. Thus, further investigation is required to resolve this inconsistency.



stringent bin. This is analogous to the use of any other specific emission control technology which could be applied to a vehicle. In the latter situation, the Premair credit would not apply to the certification process of a specific vehicle configuration or engine family, but would be applied to a manufacturer's corporate average NO<sub>x</sub> standard. For example, if the credit were 0.015 g/mi NO<sub>x</sub> and a manufacturer used Premair on 50% of its vehicles in a specific model year, then the manufacturer would subtract 0.0075 g/mi NO<sub>x</sub> from its corporate average NO<sub>x</sub> level.

We believe that it is most appropriate to grant technologies like PremAir a credit when certifying to a specific bin. This way, technologies such as PremAir are treated just like any other emission control technology being applied on the vehicle.

### Summary

As indicated in the above discussion, a number of outstanding issues still remain concerning the determination of the appropriate credit for Premair. Thus, we do not believe that it is appropriate to establish such a credit at this time. However, EPA can establish regulations outlining the procedures for certifying Premair and similar technologies which outline the procedures for determining the appropriate credit. These requirements will also address demonstrating and certifying the efficacy of the technology in certification and in-use.

**COMMENT V:** The Tier 2 vehicle standards should not be based on technologies that have shown potential in the laboratory but have not been field tested or utilized in the market place. **(American Farm Bureau Federation (IV-D-143), Peterson, J. (IV-D-254), p. 1)**

**RESPONSE:** None of the technologies necessary to meet Tier 2 standards projected by EPA are new or unique. On the contrary, we are projecting that the bulk of manufacturers will only need to make moderate increases to catalyst loading and volume, as well as improvements to catalyst design and emission calibrations. All of these technologies are well established and have been proven in the field for years. We do not project the need for any technologies that have only been "proven" in the laboratory. Although we discuss some advanced technologies, such as gasoline direct injection and fuel cells, in the RIA, we do not believe that these technologies will be necessary to meet Tier 2 standards.

**COMMENT W:** EPA should allow credits for emission technologies for which the real-life benefit is not captured by the current federal test procedure. Commenter proposes that the rule allow for credits for its insulated catalyst technology, which it claims is capable of significantly reducing cold start emissions. Commenter also provides several reports and studies to support its claims. **(Benteler Automotive (IV-D-80), all pages)**

**RESPONSE:** We want to encourage innovative technology that can result in in-use emission reductions, even if the benefits may not be measured over the FTP. However, at this time we don't have sufficient data on insulated catalyst technology to allow credits in our Tier 2 regulations. We hope to be able to work with Benteler Automotive on generating additional data so that we can better assess the need and effectiveness of this type of technology.

**Issue 26.2: Gasoline Sulfur Standards**

**Issue 26.2.1: Accuracy of EPA Analysis - Technical Feasibility/Sulfur**

**COMMENT A:** Fuel industry needs time to fully evaluate which technology best achieves desired goals before making its investment decisions. **(Conoco, Inc. (IV-D-124), p. 2, Conoco, Inc. (IV-F-120))**

**RESPONSE:** As discussed in our response to comment 26.2.2 H, we believe that refiners will have sufficient time to evaluate and choose among the available desulfurization technologies, and design and construct the installation. According to desulfurization licensors, many refiners have already completed their evaluation and are waiting the promulgation of this rulemaking before moving forward. We also made allowances in our cost analysis for those refiners which may not feel sufficiently comfortable with the improved desulfurization technologies, so, as discussed in our response to comment 23.2.1 A6, we provided for costs in our cost analysis for half of the refiners, which must install desulfurization hardware by 2004, to install proven desulfurization technologies.

**COMMENT B:** The sulfur rule does not result in the optimal conditions for innovation that EPA assumes to be the case in its Regulatory Impact Analysis. Because EPA relies on technology that has not yet been proven, the assumption that this technology can be widely employed in the timeframe required is flawed for several reasons. First, at the time of signing a contract for the technology, the guaranteed reduction performance is generally always less than the advertised performance. Second, there are always problems during initial implementation of a new technology. Third, refiners will have to choose the technology they will use based on little information in order to begin applying for permits. Fourth, there are currently only two vendors (Mobil and CDTech), which raises concerns about their ability to provide the necessary services and equipment to all refiners in the time frame provided. Fifth, confidentiality agreements required by vendors will inhibit the ability of refiners to assess the new technologies. All of these factors argue for a longer period of time to allow for the use of the new technologies EPA assumes will be used. **(Sinclair Oil Corp. (IV-D-150), Ex. 1, p. 7-8; Ex. 2, p. 6-7, Valero Energy Corporation (IV-F-78))**

**RESPONSE:** See response in 23.2.1.A.6, above.

**COMMENT C.1:** EPA has attempted to offer a simplified version of Mobil's OCTGAIN process, and has inferred that the third generation of catalyst (OCTGAIN 220) will essentially make earlier generations obsolete. This is not the case. The OCT220 technology initially appeared to foster isomerization reactions, based on the product versus feed analysis. According to Mobil, further work indicates that at low severity the OCT220 can better be classified as one which substantially decreases the amount of olefin saturation for a given level of sulfur reduction compared to conventional HDT. As the severity of desulfurization operation increases, there are other reaction chemistries that take place which help to reduce the octane loss one can expect with conventional hydrodesulfurization. However, the technology can better be described as an "octane retention maximization" technology at its normal operating severity. In other words, the ability to hold octane is not exclusively due to "isomerization." **(American Petroleum Institute (IV-D-114), p. 19, Marathon Ashland Petroleum LLC (IV-D-81), p. 9)**

**RESPONSE:** See response in 26.2.1.C.4, below.

**COMMENT C.2:** The RIA incorrectly states that "If less desulfurization is needed, then the process temperature and pressure are reduced." Only temperature control is required to control the level of desulfurization. Operating pressure is not changed from design levels. **(American Petroleum Institute (IV-D-114), p. 19-20)**

**RESPONSE:** See response in 26.2.1.C.4, below.

**COMMENT C.3:** The benefits of OCT220, to retain octane at different levels of desulfurization, vary by composition and boiling range of the feed. As the level of desulfurization increases above 95%, octane retention becomes more difficult. In many cases, where this level of desulfurization is desired and octane loss can be tolerated, the second generation OCT125 is the recommended process method, according to Mobil. This process can achieve both high levels of desulfurization (99.5+%) with the ability to recover as much feed octane as economically attractive. With OCT125, the octane recovery comes at the cost of converting some potential gasoline into light ends (C3/C4) product. **(American Petroleum Institute (IV-D-114), p. 20, Marathon Ashland Petroleum LLC (IV-D-81), p. 9)**

**RESPONSE:** See response in 26.2.1.C.4, below.

**COMMENT C.4:** Regarding commercial experience, Mobil advises that first generation (OCT100) and second generation (OCT125) OCTGAIN technology was used at Joliet for a total of six years of operation. The third generation (OCT220) was installed at Joliet in March 1999 and is currently operating according to expectations. **(American Petroleum Institute (IV-D-114), p. 21, Marathon Ashland Petroleum LLC (IV-D-81), p. 9)**

**RESPONSE:** We appreciate the input on the Mobil Octgain technologies. Through multiple conversations with Mobil Oil licensing staff, we have come to appreciate the applications of the each of the desulfurization technologies (Octgain 100, 125 and 220). In our cost analysis, we tend to work with the average refinery which usually only needs a moderate level of sulfur reduction to achieve the 30 ppm averaged sulfur standard, which is a situation best suited for the Octgain 220 desulfurization process. It is best suited for those moderate levels of desulfurization because it preserves octane better, it consumes less hydrogen, and it uses less utilities at those conditions. For this reason we highlighted that particular Mobil Oil desulfurization process. This seems to be consistent with these comments. We note that only temperature would change to make the process more severe, instead of what we stated in the DRIA which is that both temperature and pressure would change.

**COMMENT D:** EPA should contact individual refiners about what, if any, preliminary design information has been received by refiners. EPA could then determine a feed sulfur-octane loss relationship and establish the higher sulfur segment, which might be subject to escalated costs over average. **(American Petroleum Institute (IV-D-114), p. 21, Marathon Ashland Petroleum LLC (IV-D-81), p. 10)**

**RESPONSE:** Through confidentiality agreements which refiners have signed with the desulfurization vendors, the refiners generally cannot share information with us.

**COMMENT E.1:** Disputes aspects of EPA's discussion of steps refiners may take to meet the proposed limits. It is misleading to imply that because a refiner has average sulfur

levels below the proposed standard that all gasoline will meet the cap. Conversely, just because the cap is met does not mean that the average will be met. **(American Petroleum Institute (IV-D-114), p. 21, Marathon Ashland Petroleum LLC (IV-D-81), p. 8)**

**RESPONSE:** See response to comment 23.2.1A2

**COMMENT E.2:** Although EPA suggests that refiners may be able to undercut FCC gasoline and divert the undercut material to the distillate hydrotreater, this suggestion erroneously assumes that slack hydrotreater capacity exists, and the alternate option of blending to off-road diesel may not be a feasible long-term solution given the potential for requirements to reduce off-road diesel sulfur levels. **(American Petroleum Institute (IV-D-114), p. 21, Marathon Ashland Petroleum LLC (IV-D-81), p. 8)**

**RESPONSE:** We acknowledge that while some refiners may wish to undercut their FCC naphtha as part of a short term strategy to lower their gasoline sulfur level, their ability to do so may depend on whether there is spare diesel hydrotreater capacity in the refinery. However, a refiner would likely have options available to it even if its diesel hydrotreater was running at capacity. For example, a refiner could choose to increase the severity of the diesel hydrotreater by increasing its operating temperature, which would make room for the undercut heavy FCC naphtha. Alternatively, a refiner could change to a more efficient catalyst in the diesel hydrotreater which also would open up capacity for more feedstock.

**COMMENT E.3:** Also, installation of FCC feed treating to achieve desulfurization is unlikely outside of California because of the high costs of a FCC hydrotreater (the cost of which EPA underestimates) coupled with the need to install other processing and the minimal FCC yield uplift. **(American Petroleum Institute (IV-D-114), p. 21, Marathon Ashland Petroleum LLC (IV-D-81), p. 8)**

**RESPONSE:** We agree that few refiners will install FCC feed hydrotreaters for desulfurizing their gasoline. Our cost information for a feed hydrotreater is from a vendor which licenses such technology.

**COMMENT F:** Technologies under development now have little value to an industry that will need to commit capital by about the 2nd quarter of 2000 which is necessary to ensure a debugged unit by the 4th quarter of 2003. **(American Petroleum Institute (IV-D-114), p. 22, Marathon Ashland Petroleum LLC (IV-D-81), p. 9, United Refining Company (IV-D-147), p. 3)**

**RESPONSE:** Some refiners have indicated that they are unwilling to invest in gasoline desulfurization technologies which have not been commercially demonstrated. For this reason we presumed that half of the desulfurization units going on line in 2004 will be proven technologies. However, four refiners have signed license agreements to install the CDTech desulfurization technology, despite not seeing a CDHDS unit in operation. For this reason, we presumed that the other half of the desulfurization units going on line in 2004 will be improved desulfurization technologies.

**COMMENTS G.1 - .2:** Commenter provides overview of CD Tech process to document that its capability remains uncertain. Commenter indicates that CD Tech technology may not remove sufficient sulfur to meet the standards. There is no experience on the extent of any sulfur recombination reactions that would increase sulfur levels. In addition, the technology

has only been applied to revamp type applications and the ability to do accurate scale-ups is unknown. CD Tech has offered technology that claims to be cost effective at meeting lower FCC catalytic gasoline desulfurization needs. CD Tech claims a low gasoline octane loss, small hydrogen consumption, and negligible yield loss. However, CD Tech is only in the pilot plant and licensing stage. Several units may start up in late-1999 and 2000.

**(American Petroleum Institute (IV-D-114), p. 20, Marathon Ashland Petroleum LLC (IV-D-81), p. 10)**

**RESPONSE:** We are assured that the CDTech desulfurization unit will work as claimed for several reasons. First, CDTech has already installed the CDHydro process in a number of refineries and that technology has proven itself. Also we spoke to an Equilon engineer who evaluated the CDTech process against CDTech's claims, and he verified the capabilities of the unit (this summary is presented in the draft RIA. Furthermore, the CDHydro/CDHDS technology has been tested as a pilot plant on many different feeds and four refiners have signed license agreements with CDTech to install the CDHydro/CDHDS technology, which further corroborates CDTech's claims. CDTech explained to us that their technology avoids recombination reactions (which is the reverse reaction or removing sulfur from gasoline that occurs when H<sub>2</sub>S, the removed sulfur, reacts with olefinic gasoline compounds) because the technology forms disulfides in the CDHydro tower, instead of reacting the sulfur to H<sub>2</sub>S, which can recombine with olefins which are most concentrated in the stream treated by the CDHydro column. Recombination reactions may occur in the CDHDS column, however, such reactions are less of a concern because of the fewer number of olefins in the petroleum streams treated by that tower and the fact that the higher temperatures which encourage such recombinations only occur at the bottom of the column, where olefins are even lower. Other desulfurization technologies also must face the problem of recombination reactions. As discussed above, the CDHDS technology will be demonstrated soon in a large refinery.

**COMMENT G.3:** CD Tech octane loss is very dependent on FCC gasoline sulfur levels. Low sulfur gasoline tests will have a small octane loss, perhaps 0.25 (R+M)/2 while high sulfur catalytic gasoline tests will approach or exceed 1.5 (R+M)/2. The relationship is proprietary so pilot plant and actual experience will be required to completely assess the costs. **(American Petroleum Institute (IV-D-114), p. 20, Marathon Ashland Petroleum LLC (IV-D-81), p. 10)**

**RESPONSE:** CDTech has expressed what the relationship is of octane loss to the degree of desulfurization. We incorporated the desulfurization/octane loss relationship in our cost study.

**COMMENT H:** Although agrees that there are technologies that can feasibly reach a 30 ppm level, disagrees that this level is achievable in the short time period provided for all US refineries. Investment in severe hydrotreatment facilities is not feasible in the proposed time frame. These facilities strain engineering and construction resources, require long lead time and specialty equipment. Other options also may not be feasible in the time provided. **(National Petrochemical and Refiners Association (IV-D-118), p. 17)**

**RESPONSE:** Probably the most difficult severe hydrotreating facility to design and install is FCC feed desulfurization. Based on conversations with two staff persons from two different engineering and construction firms, we discovered that the most time-consuming element of the design and construction of these units is the manufacture of the high pressure reactor. Since, few of these units are expected to be installed, which is based both on our perspective and the oil industry's perspective (see comment 26.2.1 (E) (3)), we don't expect the demand on the manufacturing firms which make the high pressure

reactors for FCC feed hydrotreaters to be larger than normal. Thus, installation of the few FCC feed hydrotreating units which may be installed for 2004 should be able to be made within the four years prior to 2004. Also, it is important to note that two of the CDTech units going in were engineered and expect to be constructed within two years. Although the FCC feed hydrotreating units are larger investments, it seems that even if the engineering design work for these units takes six months more, and the equipment ordering and construction of these units takes one year more, that they should still be able to be installed within four years.

We made changes in the sulfur program to reduce the burden on the engineering and construction industry, which is the greatest for the first year of the program. The 30 ppm paper sulfur standard no longer applies the first year of the program and we also added a geographic phase-in for all the refineries in PADD 4, which, coupled with the small refiner provisions, will provide more time to the refiners which we expect would have the most difficult time complying within four years.

**Issue 26.2.2: Other Technical Feasibility Issues (Sulfur)**

**COMMENT A.1:** Removing sulfur is both feasible and affordable. It is likely that the refining industry will be able to meet the sulfur standards for gasoline in the proposed time frame. Black & Veatch and Alcoa have jointly developed a breakthrough technology for removing sulfur from gasoline. The IRVAD process uses solid alumina adsorbent to countercurrently contact liquid hydrocarbon in a multistage adsorber. The adsorbent is regenerated continuously using heated reactivation gas. In pilot plant tests, the IRVAD process has reduced the sulfur content of olefinic gasoline low enough to meet blend requirements for 30 ppm sulfur in gasoline. **(Alliance of Automobile Manufacturers (Denver) (IV-F-133), Black & Veatch (Philadelphia - Day 2) (IV-F-131), DaimlerChrysler Corporation (Vehicle Emissions Planning) (IV-F-35) (See other letters listed under Comments A.2 and A.3 that follow.)**

**RESPONSE:** We included the Black and Veatch desulfurization process in our cost and energy analysis.

**COMMENT A.2:** The technology for sulfur removal is readily available and is in widespread use in California, Japan, Europe, and other parts of the world. A near-zero sulfur fuel can be achieved (and at a modest cost). **(Alliance of Automobile Manufacturers (Atlanta) (IV-F-132))**

**RESPONSE:** See response to comment 24.2E.

**COMMENT A.3:** Desulfurization technology will be available and feasible in the timeframe during which refiners will have to meet the sulfur standards. Refiners claim that current technology is available but expensive and the newer cheaper technologies cited by EPA are unproven in the real world. However, this argument is unconvincing, given that the two new desulfurization technologies being discussed have been licensed systems since 1998 and are already being installed at some refiners. AAM cites to electronic communication from Kery Rock, CDTECH, to Tammy Klein, IRI, June 1999. **(Alliance of Automobile Manufacturers (IV-D-115), p. 141)**

**RESPONSE:** We generally agree with these comments.

**COMMENT B:** Continued viability of small refiners depends upon the successful commercialization of new and more cost-effective gas desulfurization technology. **(Frontier Oil (Denver) (IV-F-133))**

**RESPONSE:** See response to Issue 23.2.2.F.

**COMMENT C:** There may not be sufficient engineering and manufacturing capacity to complete the engineering modifications necessary to meet the proposed sulfur standard. The proposed standards and implementation schedule may increase the frequency of refinery outages and maintenance turnarounds. The U.S. refining industry already has a high capacity utilization, which will decrease as a result of this proposal. The proposal must be changed to reflect that fact that equipment cannot be run permanently and at full capacity. If the proposal is not revised, consumers may experience supply shortfalls and price spikes when outages occur. California has already experienced these problems. Factors that EPA has not accounted for include the industry's lack of operating experience

with this new technology, immense pressure on the technology vendors' and construction industry's pool of qualified labor, and the large number of business and regulatory uncertainties facing the industry at this time. There is no model or historical basis for EPA's assumption that this overall process of design, permitting, equipment acquisition, and installation will be significantly shortened for an effort involving this many refineries.

**(American Petroleum Institute (Philadelphia - Day 1) (IV-F-131), Koch Industries (Philadelphia - Day 1) (IV-F-131), Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Sunoco, Inc. (Philadelphia - Day 1) (IV-F-131), National Petrochemical and Refiners Association (IV-F-19), Tesoro Northwest Company (IV-D-91), U.S. Department of Energy (IV-D-121), p. 4)**

**RESPONSE:** In the RIA, we present our analysis of why we think the refining industry can permit, design, construct and start-up their desulfurization units within four years, which is the amount of time that about half of refiners will have (others will have more time) before they must have their unit up and running. The most compelling argument which supports our reasoning is that the 500 ppm diesel sulfur standard, which affected most refineries (some refineries elected to not produce onroad diesel, however, there were more refineries back then), went into effect three years after promulgation of the regulations, and there was no phase-in like this program.

We don't think that there will be much of an increase in gasoline production downtime due to maintenance which must be performed on the gasoline desulfurization unit. We understand that refiners will have to perform maintenance on their new desulfurization units, however, refiners have already shared with us that they can do so at the same time that they are performing maintenance on their FCC unit, without an impact on their gasoline production. We believe that some of these desulfurization units can run without maintenance for the three to four year period that FCC units are operated between shutdowns. Some of these technologies may not be able to last that long, particularly the fixed bed hydrotreaters.

For the proposed rule, we sized the capital investments for stream day capacity which allows for downtime and turnarounds 7 percent of the time. We maintained that presumption for the final rule. Also for the final rule, we accounted for an additional five percent of desulfurization to account for desulfurized unsulfurized blendstock which may have been stored up during a turnaround, and we accounted for the cost of a storage tank to store up the FCC naphtha for situations when the hydrotreater goes down but before it is time to shutdown the FCC unit.

We don't believe think this program will have the gasoline supply problems like those at California has. We address this concern in the response to comment 23.2.2 A3.

**COMMENT D:** There may be logistical problems with the implementation of the proposed sulfur standard since it overlaps with the required reductions in the use of MBTE. **(National Petrochemical and Refiners Association (IV-D-118), p. 24, National Petrochemical and Refiners Association (IV-F-19), Sunoco, Inc. (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** We addressed this comment in the response to comment 31.

**COMMENT E:** Additional time is needed for promising technologies such as sulfur absorption and biodesulfurization to be proven viable. There is also likely to be little time for learning and cost reduction in the application of this new technology. **(Energy BioSystems Corporation (IV-F-112), Ergon, Inc. (IV-D-157), p. 8, Koch Petroleum Group,**



**LP (IV-D-72), p. 13, Murphy Oil USA, Inc. (IV-D-4), p. 2, Tesoro Northwest Company (IV-D-91), Williams Energy Services (IV-F-114) (U.S. Department of Energy (IV-D-121), p. 4, 5-6, U.S. Department of Energy (IV-D-121), p. 4, 5-6)**

**RESPONSE:** See the above response to Issue 23.2.1.A.6. In that response we describe how we expanded upon the analysis which we did for the proposed rule by presuming that half of the refineries which must install a desulfurization unit for 2004 will install a proven technology, while the other half of refineries will have an improved desulfurization unit. Then in later years, we expect adsorption technologies to be used more and more as time goes on. Concerning the installation and use of improved technologies the first year of the program, since the program is not stringent the first year that the program takes effect, refiners which must install capital to meet the program's requirements in 2004 will have significant leeway that first year, and even the second year, before the unit would have to run as designed. This will provide those refiners with plenty of time to gain experience.

**COMMENT F:** The gasoline sulfur rule should conform with refinery MACT II standards and other air toxics regulations, which will regulate some of the same units. EPA is strongly encouraged to inform refiners how an Air Toxic Rule will impact gasoline. Refiners must know before making investment decisions to comply with the Tier 2 rule whether the Air Toxic Rule will impact gasoline manufacturing in any way. It would be criminal for EPA to enact rules in the Air Toxic Regulation that would cause a refinery to shut down after spending millions to comply with the Tier 2 rule. **(Flying J Inc. (IV-D-151), p. 2, National Petrochemical and Refiners Association (IV-F-19))**

**RESPONSE:** The MACT II rule focuses on the control of toxic emissions from three refinery processing units, the catalytic cracking unit, the catalytic reforming unit, and the sulfur recovery unit. Since refineries could modify all three of those process units as part of projects to comply with the Tier 2 fuel standards, the EPA has delayed promulgation of the final MACT II rule. The delay will allow refineries to consider both rulemakings as they make investment decisions and plan construction projects. The delay will also permit EPA to coordinate the compliance schedule of MACT II rule with the schedule for the Tier 2 rule and thereby minimize the number of times a refinery process must be shut down.

The Clean Air Act requires that air toxics emissions from motor vehicles be reduced, and as a minimum, the standards must apply to benzene and formaldehyde. Based on the language in the Clean Air Act, the regulations could establish more stringent control of motor vehicle emissions or regulate the qualities of motor vehicle fuel. The rulemaking schedule is to publish an NPRM by April 2000, and an FRM by the end of that year. If we propose regulations to apply to fuel quality, refiners will know what we are proposing by early next year. Should we decide to propose further restrictions on the quality of gasoline, we would consider the impact of those requirements in the context of the significant requirements involved in meeting our sulfur control program.

**COMMENT G.1:** EPA should increase the amount of flexibility for refiners with respect to standard maintenance (turnaround/shutdown) and/or upset requirements. Desulfurization units require a catalyst change-out at least biannually, necessitating a shutdown of the unit. This requirement as well as other unscheduled downtime will prevent refineries from meeting the 80 ppm cap. Suggests the possibility of allowing a set number of days per year to handle downtime without having to adhere to a very restrictive cap. Annual averages would still apply. Downtime enforcement could be handled by identifying "turnaround product" in the same manner as EPA proposes for "small refiner product" or by simply moving enforcement to the refinery gate. **(Citgo Petroleum Corporation (IV-F-33), Citgo Petroleum Corp. (IV-D-126), p. 2-3, Flying J Inc. (IV-D-151), p. 4, National**

**Petrochemical and Refiners Association (IV-D-118), p. 28-29)) (See other letters listed under Comments G.2 through G.4 that follow.)**

**RESPONSE:** The gasoline sulfur cap standard was established to prevent emission increases due to irreversible emission increases from cars running on high sulfur gasoline. With refinery turnarounds or maintenance such that the naphtha hydrotreater is shutdown but the FCC unit is still producing high sulfur blendstocks, gasoline sulfur levels can be over an order of magnitude higher in sulfur. Exposing the catalyst system of a large number of motor vehicles to this high level of sulfur can have a large impact on emission levels. We believe that we cannot allow this level of sulfur increase in numerous batches of gasoline because the unacceptable impact on the benefits of the program. There, perhaps, could be solutions that would help refiners in this situation and do not impact the environment. However these will have to be addressed outside this rulemaking process since no provisions were proposed in the NPRM.

The final rule accounts for additional costs which may be incurred when the gasoline desulfurization units go down and gasoline production is constrained by the 80 ppm cap standard. Our accounting of the costs which refiners may incur in this situation is summarized in our response to comment 23.2.1 A2.

**COMMENT G.2:** One means of partially addressing this concern would be to remove the blendstock accounting provisions of antidumping to provide at least a modest addition of flexibility. With the NO<sub>x</sub> and toxics reductions associated with the Tier 2 vehicle/fuel program, those provisions are no longer necessary. Another option would be to waive the refinery cap and just enforce on the downstream cap because refiners could develop delivery systems to assure sufficient blending to address refinery turnarounds/upsets. **(Citgo Petroleum Corp. (IV-D-126), p. 3, Phillips Petroleum Company (IV-D-82), p. A16-17)**

**RESPONSE:** See response to Issue 26.2.2.G.1, above.

**COMMENT G.3:** Suggests generally that EPA use some form of waiver mechanism or eliminate the cap to address these concerns. **(Coastal Corporation (IV-D-159), p. 7, Conoco, Inc. (IV-D-124), p. 2-3, Ergon, Inc. (IV-D-157), p. 9-10, Society of Independent Gasoline Marketers of America (IV-D-156), p. 11)**

**RESPONSE:** See response to Issue 26.2.2.G.1, above.

**COMMENT G.4:** Without the relief of some form of waiver, refiners will be forced to spend unnecessary capital to build redundant hardware or, as is more likely, will shut the refinery during the downtime. This is not cost efficient, and, if done by a number of refineries at the same time, may lead to supply shortfalls and price spikes. **(Coastal Corporation (IV-D-159), p. 7, Murphy Oil USA, Inc. (IV-D-117), p. 4)**

**RESPONSE:** We are not adopting any provisions for refiners to receive waivers for meeting the 80 ppm cap standard. As described in the response to comment 26.2.2.G.1 above, the cap standard is important to avoid significant impairment to Tier 2 vehicles' emissions control technology. If the gasoline desulfurization unit goes down, we covered the costs likely to be incurred by refiners to keep producing gasoline until the gasoline desulfurization unit can be brought on line. Our accounting of the costs which refiners may incur in this situation is summarized in our response to comment 23.2.1 A2.

**COMMENT H:** Refiners need about 5 years to meet the proposed sulfur standard; that is, to obtain adequate permitting and install the necessary technologies to reduce sulfur. **(The Coastal Corporation (Refining and Chemical Division) (IV-F-73))**

**RESPONSE:** We have heard a number of different estimates with respect to the time needed by refiners to comply with the gasoline sulfur requirement. This comment states that refiners need 5 years. In their comments to us, API said that refiners need 4 ½ years. When we spoke to two high level staff members of two large engineering firms, they said that refinery capital projects of this size (FCC gasoline treating) can be accomplished in three years, and this includes technology selection, preliminary design, permitting, detailed design, ordering of large equipment and construction. This assumes that refiners have already started the technology selection process so only a small amount of time is needed for this step after this rule goes final.

Because many refiners will be making similar investments all the same time, one of the experienced engineering staff persons we spoke to said that up to one year may be needed between ordering more difficult to manufacture hardware items, such as high pressure reactors and compressors (for FCC feed hydrotreaters), and when these items arrive. Depending on when the equipment is ordered, between three to four years may be needed for some refiners to be ready to produce low sulfur gasoline. With the phase-in of the gasoline sulfur requirements that will spread the construction by the refining industry over several years, we believe that the estimated time to design and construct these new units would take less than four years. Thus, we do not believe that 5 years is necessary. The successful implementation of the diesel sulfur program within three years, without a phase-in, corroborates our estimate of the amount of time it will take refiners to comply.

We also checked up on the progress on the part of the refiners who are installing CDTech desulfurization units in their refineries. According to CDTech, if the construction of those units are completed as planned, and they are on track to meet their construction schedule, they will have been designed and installed within two years of when those projects started to move forward. While these refineries are not disadvantaged by competition for engineering and construction resources, this information provides us certainty that allowing four years from promulgation of this rule to the start of the program's implementation is a reasonable amount of time. A more complete discussion of this issue is contained in Chapter IV of the RIA.

**COMMENT I:** The proposed rule does not allow for technological innovation in fuel chemistry to achieve effective fuel desulfurization. **(Valero Energy Corporation (IV-F-78))**

**RESPONSE:** See the above discussion of desulfurization technology contained in our response to comment 23.2.1 A6.

**COMMENT J:** EPA should more clearly acknowledge alternative technologies in the Tier 2 proposal and should not endorse any specific technologies. Currently, the proposal only references two technologies and only provides vague references to alternatives. **(Black & Veatch (IV-F-835))**

**RESPONSE:** See the above discussion of desulfurization technology contained in our response to comment 23.2.1 A6.

**COMMENT K:** EPA should make available any information or research regarding testing

programs on the CD-TECH and/or Octgain technologies. **(U.S. House Committee on Science (IV-D-253), p. 1)**

**RESPONSE:** In very general terms, we discussed pilot plant performance and any commercial experience of CDTech, Octgain, and other desulfurization technologies with the licensors of those technologies. We summarized information which was shared with us and we included projections of when the technologies will be commercially installed and operating when we know such projected start-up dates. We don't, however, have access to detailed pilot plant or processing information or research plans on these technologies, so we cannot share that information.

**COMMENT L:** The Tier 2 fuel standards should not be based on the technologies that have shown potential in the laboratory but have not been field tested or utilized in the marketplace. In 1998 EPA estimated the cost of achieving a 40 ppm sulfur standard at between 5.1 and 8.0 cents per gallon. The Tier 2 proposal predicts national average costs of 1.7 cents for the proposed 30 ppm standard and 1.5 for a 40 ppm standard. This reduction is based on two new technologies currently in the pilot stage. EPA assumes an elastic supply of these new units sufficient to supply all refiners by 2003 at low cost. These unrealistic assumptions about new technology serve to understate the cost and overstate the cost effectiveness of the proposed gasoline sulfur standard. **(Peterson, J. (IV-D-254), p. 1, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 8-9)**

**RESPONSE:** This is addressed in the response to Issue 23.2.1.A.6 and 23.2.1.A.7.

**COMMENT M:** EPA should ensure that a feasibility assessment is completed to determine whether the recommended desulfurization technology will be feasible, applicable to most refineries, and in sufficient supply to address the needs of all refiners within the proposed timeframe. **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Inhofe Questions, p. 1)**

**RESPONSE:** For the final rule, we are estimating the cost of desulfurizing gasoline assuming that a wide range of technologies will be used. According to the desulfurization licensors we spoke to, all these technologies are indeed available. Installation of these technologies within the required timeframe is doable, and discussed elsewhere in this document, and in Chapter IV B of the RIA.

**COMMENT N:** The technology on which EPA has based its proposal does not appear adequate for achieving very low sulfur levels in the 10 ppm range or lower. The results of the Department of Energy analysis indicate very high investment requirements and costs for these low levels, which must be achieved through alternative refining approaches. If these low sulfur levels are ultimately required and justified, as vehicle manufacturers have argued, then the investments in the currently available desulfurization technology will be made obsolete, to some degree, because alternative technology will be required to replace large portions of the previous investment. **(U.S. Department of Energy (IV-D-121), p. 7-8)**

**RESPONSE:** We were involved with DOE in obtaining technology cost and efficiency data from CDTech and Mobil Oil for their Octgain 220 process. Since that early time, we obtained additional data from both CDTech and Mobil Oil on how their desulfurization technologies can be used to attain even lower levels of gasoline desulfurization. However, we confirmed that DOE and their contractor ORNL were not able to contact these licensors to obtain this additional information prior to performing their study. For this reason, DOE

made the statement that the technology (CDTech and OCTGAIN 220) upon which we based our proposed rule, does not appear to be adequate to achieve 10 ppm sulfur levels. We are confident that if DOE and ORNL had used the same information available to us, that their refinery modeling runs would have shown that these technologies are indeed adequate for achieving 10 ppm, and lower, gasoline sulfur levels.

**Issue 26.3: Technical Feasibility - Timing Issues**

***[Note: See other, similar points under Issues 26.1 and 26.2 that address technical feasibility in the context of the timing of the proposed sulfur control requirements.]***

**COMMENTS A and B:** The proposed timetable will force the fuel industry to choose between unproven, but promising technology and proven higher-cost technology. The EPA timeline significantly increases the risk of failure because necessary technology may not be available. **(Conoco, Inc. (IV-F-120), Gary-Williams Energy Corporation (IV-F-122), General Motors Corp. (IV-F-136), Williams Energy Services (IV-F-114))**

**RESPONSE:** See our response to comment 23.2.1 A6.

**COMMENT C:** Without sufficient transition time, there will be difficulty associated with unproven technology resulting in significant price increases and supply problems, both of which could undermine the viability of the industry and the rule. **(Valero Energy Corporation (IV-F-78))**

**RESPONSE:** We designed the gasoline sulfur requirement to be phased in over several years, which should minimize the occurrence of problems for two reasons. First, less than half of all refiners will need to meet the program requirements in any one year, thus, contractors which do process design, equipment manufacturing and process construction firms should not be overly strained by a multitude of industry orders and should be able to deliver on their contracts in a timely fashion. It is useful to point out that no phase-in was included as a part of the onroad diesel fuel, and that program started up on time, with only minor problems very early on. Second, the first year of the gasoline sulfur program requires only very moderate gasoline desulfurization which allows refiners significant leeway in its new hydrotreater's operations.

**COMMENT D:** Some refiners will likely choose older, higher-cost, but proven technology in the absence of greater certainty about the actual long-term performance of the newer technology. **(U.S. Department of Energy (IV-D-121), p. 5)**

**RESPONSE:** This is addressed in the response to Issue 23.2.1.A.6.

## ISSUE 27: ENVIRONMENTAL/AIR QUALITY ANALYSIS

### Issue 27.1: Health Concerns

**COMMENT A:** Numerous commenters generally support the Tier 2 rule since it will have significant health benefits to the public. Given rising asthma rates and other respiratory problems associated with vehicle emissions, the implementation of this rule to improve public health is critical. (20/20 Vision (IV-F-38), 20/20 Vision (Atlanta) (IV-F-132), 20/20 Vision (Denver) (IV-F-133), Alliance for a Sustainable Future (Philadelphia - Day 2) (IV-F-131), American Lung Association (IV-D-167), p. 1, American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association (Philadelphia - Day 2) (IV-F-131), American Lung Association (Atlanta) (IV-F-132), American Lung Association (Denver) (IV-F-133), American Lung Association of Colorado (Denver) (IV-F-133), American Lung Association of Georgia (IV-F-13), American Lung Association of Maryland, Inc. (IV-F-31), American Lung Association of Michigan (IV-F-94), American Lung Association of NY (Philadelphia - Day 1) (IV-F-131), American Lung Association of Northern Ohio (IV-F-110), American Lung Association of Ohio (IV-F-65), American Lung Association of Queens, Inc. (IV-F-40), American Public Health Association/Sierra Club (IV-D-86), Appalachian Voices (Atlanta) (IV-F-132), Beasley, Joe (Atlanta) (IV-F-132), Botwan, Judy (Cleveland) (IV-F-134), Brock, Kathryn (Cleveland) (IV-F-134), Chicago Dept. of the Environment (IV-D-200), p. 2, Christenson, C. (IV-F-90), Clean Air Conservancy (IV-F-75), Clean Air Council (IV-F-28), Clean Air Network, et. al. (IV-F-95), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Colorado Environmental Coalition (IV-F-87), Colorado Public Interest Group (Denver) (IV-F-133), Cornicelli, David (Cleveland) (IV-F-134), Crane, Claudia (Philadelphia - Day 1) (IV-F-131), Curry, Susan (Philadelphia - Day 2) (IV-F-131), Cuyahoga County Planning Commission (IV-F-83), Divgi, Varanda (Atlanta) (IV-F-132), Earth Day Coalition (IV-F-82), EcoCity Cleveland (IV-F-84), Englebrecht, Erin (Atlanta) (IV-F-132), Environmental Defense Fund (IV-F-128), Environmental Defense Fund (Denver) (IV-F-133), Environmental Health Watch (IV-F-81), Environmentally Challenged Group (IV-D-83), Evangelical Environmental Network (IV-F-22), Fernandez, H. (Philadelphia - Day 1) (IV-F-131), Fletcher, Robert E. (Atlanta) (IV-F-132), Frank, Erica (IV-F-9), Frumpkin, Howard (Atlanta) (IV-F-132), Fullam, Mary Jane (Philadelphia - Day 1) (IV-F-131), Fund for Public Interest Research (Atlanta) (IV-F-132), Galik, D.S. (IV-F-79), Garrettson, Lorne (Atlanta) (IV-F-132), Glassroth, J., et. al. [587 individuals] (IV-D-227), Global Environmental Energy Technology (Philadelphia - Day 2) (IV-F-131), Gutierrez, Mr. (Cleveland) (IV-F-134), Gutierrez, R. (IV-D-55), Hamilton, Vickie (Atlanta) (IV-F-132), Hester, Randy (Philadelphia - Day 1) (IV-F-131), Jennifer Lee (Denver) (IV-F-133), Joseph, Peter M. (IV-F-24), Kondas, L. (IV-F-66), Lancaster Greens (IV-F-29), Lancaster Greens (Philadelphia - Day 2) (IV-F-131), Lang, David M. (Philadelphia - Day 1) (IV-F-131), Lavin, Nancy (Philadelphia - Day 2) (IV-F-131), League of Women Voters (IV-D-213), League of Women Voters (Philadelphia - Day 2) (IV-F-131), League of Women Voters - La Grange Area (IL) (IV-D-169), Levine, Richard (Philadelphia - Day 2) (IV-F-131), Levy, Robin (Atlanta) (IV-F-132), Long, B. (IV-F-67), MD Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Maden, Rachel (Philadelphia - Day 2) (IV-F-131), Maslin, Mindy (Philadelphia - Day 2) (IV-F-131), Mason, P. (IV-F-70), Mathur, A.T. (IV-F-106), Mavec, Ken (Cleveland) (IV-F-134), Milburn, J. (IV-F-42), Miller, C.R. (IV-F-63), Miller, J.C. (IV-F-71), Minott, J. (IV-F-7), Mountcastle, Brooks (Philadelphia - Day 2) (IV-F-131), NAACP (Atlanta) (IV-F-132), NE Ohio Impact Project (IV-F-80), NJ Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), NJ Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), National Conference of State Legislatures (IV-D-214), National Environmental Trust (IV-F-26), New Jersey Environmental Lobby (IV-D-261), Ohio Citizen Action (IV-F-100), Ohio Environmental Council (Cleveland) (IV-F-134), Ohio Local Air Pollution Control Officials Association

(IV-F-97), Ohio Lung Association (Cleveland) (IV-F-134), Ohio Public Interest Research Group (IV-F-98), Oregonians for Clean Air (IV-D-202), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), PA Public Interest Research Group (Philadelphia - Day 2) (IV-F-131), Paul Berger (Denver) (IV-F-133), Perkul, Betty (Cleveland) (IV-F-134), Pete Maysmith (Denver) (IV-F-133), Physicians for Social Responsibility (IV-D-194), Rader, Bonnie (Denver) (IV-F-133), Ray, C. (IV-F-101), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), Robinson, Linda (Cleveland) (IV-F-134), Rollins, Rebecca (Cleveland) (IV-F-134), Rooney, J. Astra (Philadelphia - Day 2) (IV-F-131), Rovito, S. (IV-F-68), Ryder, Claire (Cleveland) (IV-F-134), STAPPA/ALAPCO (IV-D-67), p. 1-2, STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Scott, Kevin (Philadelphia - Day 1) (IV-F-131), Scott, Kevin (Philadelphia - Day 2) (IV-F-131), Senate Committee Materials (IV-D-229), Sen. Lieberman, p. 1, Sierra Club (IV-F-49), Sierra Club (Philadelphia - Day 2) (IV-F-131), Sierra Club - Northeastern OH (Cleveland) (IV-F-134), Sierra Club, Maryland Chapter (IV-F-52), Sierra Club, Maryland Chapter (IV-F-53), Sierra Club, Northeast Ohio Group (IV-F-103), Sierra Club, Ohio Chapter Energy Committee (IV-D-101), Sierra Club, Pennsylvania Chapter (IV-F-37), Smith, Tom (Cleveland) (IV-F-134), Sun City Center Woman's Club (IV-D-297), Sunday, D. (IV-F-108), Sweeny, Shawn (Cleveland) (IV-F-134), Tennessee Environmental Council (Atlanta) (IV-F-132), Thurston, G.D. (IV-F-130), Tomaka, Tom (Atlanta) (IV-F-132), Trepal, C. (IV-F-109), U.S. Public Interest Research Group (IV-F-102), U.S. Public Interest Research Group (IV-F-55), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Cleveland) (IV-F-134), Waring, George (Atlanta) (IV-F-132), Waters, Eric (Philadelphia - Day 2) (IV-F-131), Weaver, Heidi (Philadelphia - Day 1) (IV-F-131), Winant, Howard (IV-F-18), Wyncote Audubon Society (IV-F-8), Zeller, A. (IV-F-107)

**RESPONSE:** We acknowledge and agree that significant health benefits will accrue to the public through the implementation of this rule. See Sections III and IV.D of the preamble and Chapters II, III, and VII of the RIA for our analysis of the benefits of this rule.

**COMMENT B:** Generally states that the proposed rule does not go far enough to protect public health. (Mittledorf, Joshua (IV-F-21))

**RESPONSE:** We believe our actions in the Tier 2/Sulfur proposal are appropriate under Sections 202 and 211 of the Clean Air Act, from which EPA derives its authority to regulate motor vehicles and their fuels. EPA reached this conclusion based on a comprehensive review of air quality needs, technical feasibility of emission control technologies for automobile manufacturers and desulfurization technologies available to refiners, cost, and other relevant factors. The commenters did not provide any information that disputes EPA's analysis or suggests that more stringent vehicle and fuel standards would be cost-effective in the relevant time frame.

**COMMENT C:** Diesel exhaust is toxic and has been identified as a probable carcinogen. EPA should revise the rule to discourage the use of diesel engines (see Issue 3.1). In certain cases, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was over 300.



**(American Lung Association of Metropolitan Chicago, et al. (IV-D-226), American Lung Association of Maryland, Inc. (IV-F-31), Glassroth, J., et. al. [587 individuals] (IV-D-227), Multiple Private Citizens (IV-D-6, 12, 15, 16, 30, 33, 184, 248, 268, and 269), Sierra Club (IV-F-14), Sierra Club (IV-F-3), Sierra Club (IV-F-49), Sierra Club, Pennsylvania Chapter (IV-F-37), Transcript of Emails Received (IV-D-36, 236, 239, and 240), Union of Concerned Scientists (IV-D-195), p. 1, 8-9, White, Randall F. (IV-F-10))**

**RESPONSE:** Diesel exhaust has been identified as a likely human carcinogen, and the evidence suggests that the gaseous hydrocarbons and particulate matter in the exhaust is the source of the carcinogenic potential of diesel exhaust (see the response to Comment 27.1.G.2, below). The Tier 2/Sulfur rule will mitigate the toxic effects of diesel exhaust by requiring all light-duty vehicles, including light-duty diesel vehicles, to meet more stringent emission standards for hydrocarbons and particulate matter. EPA is actively engaged in reviewing the toxicity of diesel exhaust, and we will further evaluate the health effects of diesel exhaust and the potential for reducing these health effects as part of the rulemaking process for our diesel and air toxics rules.

Our legal authority requires us to set standards based, *inter alia*, on air quality, technological feasibility, and cost considerations. We believe that the standards we have set meet this obligation. These standards will reduce PM emissions from diesel engine-equipped cars and light trucks, thereby reducing diesel particulate emissions and mitigating any increase in diesel particulate emissions due to increased use of diesel engines in cars and light trucks. Furthermore, these standards require that vehicles powered by diesel engines meet the same particulate and hydrocarbon standards that vehicles equipped with gasoline engines must meet.

**COMMENT D:** Frequently cited studies on diesel health effects are not based on data that is representative of today's diesel engine fuel. **(Engine Manufacturers Association (IV-F-118), Engine Manufacturers Association (Atlanta) (IV-F-132))**

**RESPONSE:** Commenters have not suggested, nor are we aware of, alternative studies; furthermore, commenters have not provided any supporting evidence for their assertion that diesel fuel characteristics have changed over the years in a manner that would materially affect the quantity, composition, or cancer-causing potential of diesel engine emissions. In any case, we do not believe this comment is relevant to our decisions regarding the emission standards for light-duty diesel cars and trucks. These standards are based primarily on the need to reduce NO<sub>x</sub>, NMHC, and PM emissions to attain and maintain the ozone and PM NAAQS and the availability of technology to meet the more stringent NO<sub>x</sub>, NMHC, and PM emission standards, not on a quantitative analysis of the health effects of diesel exhaust. The mitigation of health risks associated with diesel exhaust other than the risks reflected in the NAAQS is an added benefit of the Tier 2/Sulfur rule, but we are not basing our legal case for action under section 202(i) on it.

**COMMENTS E and F:** One commenter argues that EPA has not demonstrated that sulfur must be reduced to the proposed levels because it contributes to air pollution reasonably anticipated to endanger public health. Another suggests that the information provided in the notice of proposed rulemaking does not include a conclusive finding that sulfur in gasoline causes air pollution which endangers public health or welfare. A condition of section 211(c)(1)(A) of the CAA requires that EPA find that "any emission product of such fuel or fuel additive causes or contributes to air pollution which may reasonably be anticipated to endanger the public health or welfare." **(American Petroleum Institute (IV-D-114), p. 5, Williams Companies, Inc. (IV-D-53), p. 4-5))**

**RESPONSE:** EPA believes that the notice of proposed rulemaking established both the need to lower emissions in order to protect public health and the necessity of lowering the sulfur content of gasoline in order to do so. Higher sulfur levels in gasoline have been shown to increase emissions of regulated pollutants and hazardous air pollutants from vehicles with technology representative of that currently in use. Higher sulfur levels have also been shown to cause even greater increases in emissions of regulated and hazardous air pollutants from vehicles with technology likely to be used to meet the Tier 2 standards. Emissions of these pollutants have been shown to contribute to continued nonattainment of the ozone standard, to elevated particulate matter concentrations, and to the health problems associated with elevated ozone, PM, and hazardous air pollutant levels, respectively. The benefit-cost analysis accounts for the economic effect of some of these health problems.

Furthermore, our investigation suggests that higher sulfur levels in some batches of gasoline can have a carry-over effect on vehicle emissions. Our research shows that these higher emissions may persist even if the vehicle is later operated on lower-sulfur fuel. In effect, higher sulfur levels partially disable vehicles' emissions control systems.

These points are addressed in greater depth in our responses to Issues 14.A, 22.N, and 26, and in our discussion of our 211(c) authority in Appendix D of the Regulatory Impact Analysis. Based on that discussion, we disagree with the commenters' interpretation of the requirements of that section.

**COMMENT G.1:** Commenters argue that the claimed health effects of diesel particulate should not be a factor in setting Tier 2 emission limits. According to one commenter, the Tier 2 rulemaking, which is expressly designed to address ozone and PM air quality objectives, and not mobile source air toxics concerns, is not a legitimate or legally defensible forum for addressing any perceived cancer risks associated with diesel emissions. In addition, EPA has not yet completed its carcinogenicity assessment for diesel exhaust and recent evaluations of the diesel database raise serious questions about whether diesel exhaust should be considered a human carcinogen. EPA's efforts in the Tier 2 preamble to assess the impact of light-duty diesel on air toxics exposure are premature and misplaced. Recently, scientific experts, including CASAC, have questioned whether the available data can be used to conduct quantitative risk assessment for humans. There is growing scientific consensus that the uncertainties and inadequacies in the existing database render it inadequate to assess diesel carcinogenicity. In addition, there are only two epidemiological studies that may be suitable for QRA since they include some exposure analysis. The Health Effect Institute (HEI) has determined that the "Garshick" epidemiological study is not suitable for QRA and the "Steenland" study is also not suitable since it has deficiencies that undermine their overall conclusions and call into question the reliability of their exposure estimates. Health effects concerns do not at this time provide a supportable basis for risk management or setting Tier 2 emission limits for diesel engines. Navistar provides significant discussion regarding the deficiencies of both the Garshick and Steenland studies (cited on p. 27) and also provides as an attachment entitled "An Analysis of the Suitability of Steenland et al. for Conducting Quantitative Risk Assessment of Diesel Exhaust," dated June 8, 1999. **(Navistar International Transportation Corp. (IV-D-50), p. 5, 26-28) (See other letter listed under Comment G.2 that follows.)**

**RESPONSE:** See response to Comment G.2., below.

**COMMENT G.2:** Volkswagen reminds EPA that a report recently published by the Health Effects Institute (HEI), calls into question the basis for current quantitative risk assessment

for diesel exhaust and provides a summary of the findings and recommendations of HEI in this report. [HEI, "Diesel Emissions and Lung Cancer: Epidemiology and Quantitative Risk Assessment. A Special Report of the Institute's Diesel Epidemiology Expert Panel," Cambridge, MA, dated June 1999]. VW recommends that EPA consider the uncertainties raised by the HEI panel and the need for further investigation and notes that the report raises certain questions regarding the need for the stringency of the Tier 2 standards for diesel engines. **(Volkswagen of America, Inc. (IV-D-60), p. 5-6)**

**RESPONSE:** Commenters make two main points, neither of which we believe to be valid:

1. The Tier 2 rulemaking, which is expressly designed to address ozone and PM air quality objectives, and not mobile source air toxics concerns, is not a legitimate or legally defensible forum for addressing any perceived cancer risks associated with diesel emissions.

The primary purpose of the Tier 2 regulation is to reduce ozone and PM emissions under section 202(a) and 202(i), in particular, to meet the NAAQS for those pollutants. Our primary basis for the Tier 2/Sulfur standards is the need to further reduce emissions contributing to continued nonattainment of the ozone and PM NAAQS. That need fully justifies our action to promulgate the Tier 2/Sulfur standards. Having met that hurdle, however, nothing in the Clean Air Act prevents us from recognizing and where possible quantifying other benefits associated with the Tier 2/Sulfur program. Indeed, it is consistent with the letter and spirit of the Clean Air Act to examine and evaluate the full range of health and welfare impacts from car and light truck emissions and from the Tier 2/Sulfur standards.

Furthermore, although the "Phase II Study" mandated by Section 202(i) of the CAA was limited to assessing whether or not tighter standards for LDVs and LDT1s were required to meet the NAAQS, EPA is not restricted to regulating emissions from these vehicles solely under section 202(i). Section 202(l) specifically provides for EPA regulation of hazardous air pollutants (i.e. air toxics) from motor vehicles and states that any standards promulgated pursuant to section 202(l) would be "under subsection 202(a)." Thus, it is clear that EPA has authority to regulate emissions of toxic air pollutants from all LDVs and LDTs. In fact, the formaldehyde standards promulgated today for all LDVs and LDTs are promulgated under sections 202(a) and (l).

Section 202(i) does not apply to LDT2s. Instead of promulgating the Tier 2/Sulfur regulations for LDT2s under section 202(i), we are promulgating the LDT2 regulations under 202(a).

We are promulgating standards for LDT3s and LDT4s under sections 202(a)(1) and (3). Section 202(a)(3) requires that standards for PM from heavy-duty vehicles (LDT3s and 4s are considered in the CAA to be heavy-duty vehicles) shall "reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year for which such standards apply, giving appropriate consideration to cost, energy and safety factors."

2. The uncertainties and inadequacies in the existing database render it inadequate to assess diesel carcinogenicity.

Although uncertainties remain to be resolved in the quantitative risk assessment of diesel exhaust and its components, there is a growing scientific consensus that diesel exhaust and more specifically diesel PM is a likely human carcinogen. The Health Effects Institute report cited by the commenters reports that the following organizations have determined that diesel exhaust is a probable human carcinogen: National Institute for Occupational

Safety and Health (1988), International Agency for Research on Cancer (1989), World Health Organization (1996), National Toxicology Program (1998), Office of Environmental Health Hazard Assessment (California EPA 1998), and the U.S. EPA (1998). We note that California's identification of diesel exhaust as a toxic air contaminant was approved by its Scientific Review Panel.

EPA's most recent draft risk assessment for diesel emissions classified diesel exhaust as a likely human carcinogen. As discussed in Chapter III of the RIA, it is the hydrocarbon and particulate fractions of diesel exhaust which are thought to be the source of diesel exhaust's carcinogenic potential. Furthermore, while some of the cancer risk is likely associated with exposure to the gaseous components of diesel exhaust, studies conducted suggest that the particulate component plays a substantial role in carcinogenicity. We conclude that, given the available information and the standards promulgated for hydrocarbon emissions, the Tier 2 PM emission standards represent a reasonable and prudent step to protect public health. These standards will mitigate the risks associated with exposure to PM, including diesel PM, and can be legitimately claimed as a qualitative benefit of the Tier 2/Sulfur controls. Furthermore, while we believe that reductions in diesel PM emissions would have large health and economic benefits by reducing the cancer risk from diesel PM, it should be noted that such benefits were not included in our calculation of the health and economic benefits of the Tier 2/Sulfur program.

**COMMENT H:** The Tier 2 rule could lead to higher ozone levels in certain areas and may impose significant health risks on the American people. EPA has not adequately evaluated the potentially counterproductive impacts on ozone concentrations from the NO<sub>x</sub> reductions occurring from the Tier 2 rule [see also Issue 27.4, Point (B)]

Comments and supporting arguments relating to this issue fall into three general categories:

- (1) The higher levels of ozone concentrations that occur on weekends versus weekdays in several metropolitan areas show how nitrogen oxide (NO<sub>x</sub>) reductions can be counterproductive to efforts to lower ozone concentrations in many urban areas.

**Letters:**

**General Motors Corporation (IV-D-209) Volume 2, pp.39-46.**  
**Alliance of Automobile Manufacturers (IV-D-40), pp. 14-16**  
**McIntosh, D. (IV-D-257), p. 2**  
**McIntosh, D. (IV-G-27), p. 4**

- (2) Air quality modeling shows counterproductive increases in ozone concentrations when NO<sub>x</sub> reductions occur in several metropolitan areas during ozone episodes.

**Letters:**

**General Motors Corporation (IV-D-209), Volume 2, pp.39-46**  
**Alliance of Automobile Manufacturers (IV-G-40), pp. 14-16**  
**McIntosh, D. (IV-D-257), p. 2**  
**McIntosh, D. (IV-G-27), p. 4**

- (3) EPA should identify the total population potentially at risk of adverse health effects in each affected county and metropolitan area and should compare this to the total population potentially affected by adverse health effects under the Tier 2/Sulfur rule.

**Letters:**

**McIntosh, D. (IV-G-27), p. 7**

**McIntosh, D. (IV-D-257), p. 2**

**RESPONSE:** As noted in the preamble to the final regulations, EPA has explicitly considered both the evidence for and analyses of any potential localized elevations in ozone that might occur as a result of this rule. In so doing, EPA carefully studied information provided by commenters as well as its own analyses of this issue. As indicated in the preamble, EPA's modeling of the final rule shows that improvements in ozone levels are expected to occur throughout the country because of the Tier 2/Gasoline Sulfur (Tier 2) program.

EPA's assessment of air quality changes for 2007 and 2030 focused on 37 states in the East because these states cover most of the areas with 1-hour nonattainment problems. EPA found that the program significantly lowers model-predicted exceedances of the ozone standard. In 2007, the number of exceedances in metropolitan areas is forecasted to decline by nearly one-tenth and in 2030, when full turnover of the vehicle fleet has occurred, the program lowers such exceedances by almost one-third. In these same areas, the total amount of ozone above the National Ambient Air Quality Standard (NAAQS) is forecasted to decline by about 15 percent in 2007 and by more than one-third in 2030. In the vast majority of areas, the air quality modeling predicts that the program will lower peak summer ozone concentrations for both 2007 and 2030. The reduction in daily maximum ozone is nearly 2 ppb on average in 2007 and over 5 ppb on average in 2030. These reductions contribute to EPA's assessment that the program will provide the large set of public health and environmental benefits summarized in Section IV.D of the Preamble. The forecasted impacts of the program on ozone in 2007 and 2030 are further described in the Tier 2 Air Quality Modeling technical support document (TSD).<sup>12</sup>

The preamble to the final rule also notes that, in addition to these ozone reductions, a few metropolitan areas had predicted ozone increases in portions of the area during parts of the episodes modeled. In most of these areas, the sum of the reductions exceed the sum of the increases, allowing EPA to conclude that there will be a net reduction in ozone levels in these areas due to Tier 2. In the very small number of exceptions, the Agency did find benefit in the form of reductions of peak ozone levels. Based upon a careful examination of this issue, including EPA's modeling results as well as consideration of the modeling and analyses submitted by commenters, it is clear that the significant ozone reductions from this rule outweigh the limited ozone increases that may occur. Additional details on this issue are provided below and in the Tier 2 Air Quality Modeling TSD.

Collectively, EPA believes these results indicate that it will be much easier for states to develop their State Implementation Plans (SIPs) which will attain and maintain compliance with the one-hour ozone standard. In the limited number of cases mentioned above, EPA will work with states conducting more detailed local modeling of their specific local programs to ensure that they are designed to provide attainment. Notably, other upcoming federal measures to lower ozone precursors will aid these efforts. If state modeling of local programs shows a need, the Agency will work with states to plan further actions to produce attainment with the NAAQS in order to protect the public's health and the environment. For these reasons, EPA believes that the Tier 2 program, when combined with a comprehensive program of regional reductions from relevant stationary and mobile source categories as well as local programs, will not result in the ozone

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<sup>12</sup>U.S. Environmental Protection Agency, Technical Support Document for the Tier 2/Gasoline Sulfur Ozone Modeling Analyses, December 1999.

increases suggested by these commenters.

We also note that no state responsible for achieving attainment of the ozone NAAQS has commented that Tier 2 will make achieving attainment harder, and many have commented positively. For example, enthusiastic support is given to Tier 2 by the Northeast States for Coordinated Air Use Management (NESCAUM), by the State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ ALAPCO), by the New York Department of Environmental Conservation, by the Illinois Environmental Protection Agency, and by the Connecticut Department of Environmental Protection. It is difficult to accept statements by GM and the Alliance that the Tier2/Sulfur program will make it hard for Chicago and New York, for example, to achieve attainment, when the agencies responsible for that attainment so strongly support Tier 2. Comments by these organizations are in Air Docket A-97-10.

EPA also responded to the concerns and suggestions from Congressman David M. McIntosh regarding population exposures in a letter dated September 17, 1999. The response was based on the modeling that was done for the proposal of this rule. This letter has been placed in the rulemaking docket as a supplement to the response to comments. The information below updates the information in our September 17<sup>th</sup> letter.

More detailed responses to the comments on this issue are provided below. The discussion is organized according to (1) evidence derived from observational air quality analyses, particularly those examining the so-called "weekend effect," (2) conclusions derived from air quality modeling analyses of Tier 2, and (3) analyses of the "net" ozone-related health benefits predicted from Tier 2.

### **Weekend versus Weekday Analyses**

In summary, GM and the Alliance assert that, because some monitoring locations exhibit higher ozone levels on weekends than on weekdays, we should conclude that further NO<sub>x</sub> reductions from Tier 2 will produce increases in ozone concentrations in future years. In responding to this comment, it is useful to review the science relating to this assertion. As pointed out by the National Academy of Science Panel on ozone, basic atmospheric chemistry indicates that the net effect of NO<sub>x</sub> emissions reduction is to reduce ozone downwind.<sup>13 14</sup> Nonetheless, based on both smog chamber and modeling analyses, a mix of ozone increases and decreases may occur along the way to the ultimate reductions downwind. The distribution of such changes depends upon regional and local variations in the concentrations of volatile organic compounds (VOC) and nitrogen oxides, as well as other atmospheric factors. The relative effectiveness of NO<sub>x</sub> and VOC reductions can vary substantially with location and meteorology.

Commenters claim that if a site exhibits higher weekend ozone, the cause must be that local NO<sub>x</sub> reductions have occurred due to lower vehicle and other activity. Further they claim that these short-term, site-and-meteorology-dependent observations will be predictive of atmospheric changes that will occur well into the future when the major benefits of this rule will be realized. EPA contends that the state of scientific-

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<sup>13</sup>National Research Council, Rethinking the Ozone Problem in Urban and Regional Air Pollution, 1991.

<sup>14</sup>Commenters mistakenly rely on a draft report of the Synthesis Team for North American Research Strategy for Tropospheric Ozone, An Assessment of Tropospheric Ozone Pollution: A North American Perspective, Draft Report, December 20, 1998. This draft, which has been undergoing peer review requests, on each page, "do not quote or cite." EPA does not contest the draft report suggestions, but chooses instead to respect the authors' request in not using other material from the same report to rebut some of the commenters claims.

understanding regarding these observations is wholly incomplete, and that commenters have over-interpreted and extended what evidence exists. In sum, the day-of-week analyses do not permit scientifically supportable, clear conclusions about the future benefits of the Tier 2 program. Given the current information, EPA finds that the most reliable conclusions about Tier 2 must be based on modeling analyses and scenarios that reasonably reflect future atmospheric conditions. The following material summarizes some more specific issues in the observed weekend results.

Commenters provided "weekend" analyses of several cities as well as national maps and a national analysis of part of the 1999 ozone season. The most widely examined area with respect to observational data is the Los Angeles Basin. Here, a short-term (weekend-weekday) comparison was examined by commenters' analysts (Environ). They found higher levels of ozone on Saturdays as compared to Wednesdays at some, but not all sites. They also found the occurrence of this observation changed depending on the years analyzed. The analysis concludes that the observations are consistent with a conclusion that NO<sub>x</sub> controls would only aggravate the ozone problem.

The weekend effect in the Los Angeles area has also been examined by investigators from the University of California at Los Angeles (UCLA) on behalf of the California Air Resources Board (CARB). These researchers examined the short-term weekend/weekday phenomenon, as well as a more extended analysis of ozone trends over time.<sup>15 16</sup> UCLA and CARB reached several conclusions that question the most important claims made by the commenters. Namely, UCLA and CARB found that (1) variation in weekly emissions of NO<sub>x</sub> and VOC in the basin have not been well-quantified, as a result, cause and effect cannot be concluded based on these observations; (2) higher ozone levels on Saturdays might be the result of the "carry-over" of suspected higher emissions from Friday night; and (3) the long-term (10 year) comparison showed that ozone levels decreased significantly during a period in which NO<sub>x</sub> (and VOC) emissions decreased -- no long-term NO<sub>x</sub> related ozone increases were observed. Overall, the UCLA analysts concluded that the "transitory weekend effect" data were not as important with respect to NO<sub>x</sub> control implications as long-term trends. Commenters ignored the implications of these other important observational findings.

EPA extended the LA analyses to examine all sites from 1986 through 1998 and examined the long-term trends in ozone on weekdays and weekend days.<sup>17</sup> The analyses found a continuing downward trend in ozone not only on all days combined, but also on Saturdays (See Figures 1-2<sup>18</sup>). Again, this occurred during a period of substantial NO<sub>x</sub> reductions. In essence, EPA believes a full examination of the available data from the Los Angeles experience, if anything, supports the effectiveness of tight mobile source controls in the context of an overall balanced attainment strategy. In fact, the State of California is pursuing such a strategy in the state.

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<sup>15</sup>Blier, Warren, Arthur M. Winer, Darin Hansen, and Namita Verma of the University California at Los Angeles for California Environmental Protection Agency, Characterization of Ozone Episodes in the South Coast Air Basin: Effects of Air Parcel Residence Time and Weekend/Weekday Differences, June 28, 1996.

<sup>16</sup>Blier, Warren, Arthur M. Winer, Darin Hansen, and Namita Verma of the University California at Los Angeles for California Environmental Protection Agency, Analysis of Weekday/Weekend Differences in Ambient Air Quality and Meteorology in the South Coast Air Basin, February 18, 1996.

<sup>17</sup>Briefing presentation by John D. Bachmann entitled *NO<sub>x</sub> Disbenefits: the Weekend/Weekday Effect: Air Quality Analysis*, for Duke AWMA, January 1999.

<sup>18</sup>These figures provide box plots of daily maximum ozone distributions or the LA MSA (5<sup>th</sup> percentile, 10<sup>th</sup> percentile, 25<sup>th</sup> percentile, 50<sup>th</sup> percentile, 75<sup>th</sup> percentile, 90<sup>th</sup> percentile, and 95<sup>th</sup> percentile and means (starred value) joined by a trend line.

Commenters also provided evidence regarding the weekend effect in specific analyses of other areas, such as New York City and Chicago, and data from additional sites for specific time periods. In general, these analyses are far less comprehensive than that for the Los Angeles basin; like the Los Angeles case, none of the analyses provides realistic estimates of weekend vs. weekday emissions to support the hypothesis that NO<sub>x</sub> reductions on the weekend cause higher ozone levels at some sites. The possibility of a "carry-over" effect also exists in other areas. Unlike Los Angeles, many of the additional analyses do not account for factors that may affect the observations. For example, inferences regarding the observation of higher ozone on weekends in Chicago are confounded by the fact that, presumably by coincidence, temperatures tended to be higher on weekends in that area for the period in question.<sup>19</sup> In general, the results of the available single-city analyses appear to be preliminary and generally have not yet been published in the peer-reviewed literature. EPA is unaware of any study that has been able to account and control for all the important variables, and then isolate NO<sub>x</sub> emissions reductions as the cause of the ozone increases. At most, the available studies are suggestive of a phenomenon that might or might not be related to NO<sub>x</sub> reductions at specific locations.

Commenters also provided two large scale maps that depict weekend ozone changes (increases and decreases) for a large number of sites for a three-year period without a full explanation of how they were completed, or why they were designed the ozone ppb category intervals the way that they did. Unfortunately, the results for the majority of sites fall within a ozone ppb category that makes it impossible to determine the net result.

The Alliance supplied an analysis of EPA's ozone monitoring results for 1999 for individual monitors throughout the country. The analysis was derived from a recent tabulation of these results in a study by the Clean Air Network.<sup>20</sup> The Alliance's work showed that on average weekend days have a greater number of exceedances of the NAAQS than weekdays. The most significant problem with this analysis is its reliance on less than one ozone seasons- worth of data to draw conclusions about a major pattern of urban pollution. The results of such an analysis are likely to cover the short time period examined at best. Additionally, there was no information on the relationships of NO<sub>x</sub> emissions and the ozone levels at the monitors and the general problems that EPA discussed above with studies of this kind. Also, the commenter provided results based on the eight-hour standard, rather than the existing one-hour standard. EPA examined the results for the one-hour standard that is the primary basis for the Tier 2 rule. The Agency found that there was an average of 25 exceedances of the one-hour standard on weekdays and average of 22 exceedances on weekends. This limited finding further calls into question the commenter's position on the weekend vs weekday effect.

EPA places greater reliance on a more temporally-comprehensive regional study related to this issue done for the Air Quality Analysis Workgroup of the Ozone Transport Assessment Group (OTAG) in September 1996.<sup>21</sup> This group was composed of nationally-known air quality modeling experts from the federal and state government, industry, and major university research centers. In the study, Husar used monitoring data

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<sup>19</sup>Koerber, M., *Examination of Differences in Weekday and Weekend Concentration - Draft Report for Lake Michigan Air Directors Consortium (LADCO)*, 1999.

<sup>20</sup>Clean Air Network, No Escape: Can You Ever Really "Get Away" from the Smog? A Midseason Look at Ozone in 1999, August 1999.

<sup>21</sup>Husar, Rudolph B., "Weekly Pattern of Ozone over the OTAG Region," for the Air Quality Analysis Workgroup of the Ozone Transport Assessment Group, September 1996.



from EPA, States, and other sources from 1988 to 1995 to examine the weekly pattern of ozone over the entire OTAG region (37 eastern States).

The study concluded: "The weekly emission cycle results in a weekly ozone cycle. Over the entire OTAG region, the 90<sup>th</sup> percentile ozone is reduced from 87 to 81 ppb from Friday to Sunday. The daily exceedances (>120 ppb) are reduced on Sundays to one-third of the exceedances on Fridays. This analysis indicates that if the OTAG-wide weekday emissions would be reduced to the current weekend levels, then ozone exceedances would decline by at least [a] factor of three."<sup>22</sup> The study goes on to make the point that the strongest differences between Friday ozone levels and Sunday ozone levels occurs in major metropolitan areas. These conclusions are consistent with the expectation that NO<sub>x</sub> reductions are beneficial over large geographical scales, even if the benefits vary on a local scale. Even here, the lack of emissions data limits the results to only the suggestion that the observed large-scale regional benefits are due to weekend NO<sub>x</sub> reductions. Nevertheless, this larger examination does draw into question the commenters' suggestions of widespread ozone increases from NO<sub>x</sub> controls.

In summary, EPA believes that none of the weekend/week day air quality analysis that has been done to date is comprehensive or detailed enough to draw the conclusions about the counterproductive effect of Tier 2 NO<sub>x</sub> reductions that the commenters are making. It is possible that transitory ozone increases in some areas may be related to NO<sub>x</sub> reductions, but the extent and applicability of such results is confounded at best. Several other factors could account for observed weekend increases in ozone levels besides reductions in NO<sub>x</sub> emissions. These factors include differences in temporal and spatial NO<sub>x</sub> emissions patterns on weekends and weekdays, differences in temperatures and other meteorological conditions existing on weekends vs. weekdays and the influence of upwind areas on local ozone concentrations.

Moreover, the collection of the available results, if assumed to be causally linked to emissions reductions, actually support large scale benefits of NO<sub>x</sub> reductions over broad regions. Most importantly, however, they would only apply to the time and place of the study, and not necessarily to air quality conditions in the future (such as the time period of 2007 to 2030 examined in the air quality modeling.) For all of these reasons, EPA believes that predictive air quality models can and should be used as a primary tool to address the issue of the benefits of NO<sub>x</sub> control scenarios. Responses to comments on the implications of available predictive modeling are discussed in the next section.

### **Air Quality Modeling**

Two separate sets of photochemical grid modeling analyses have examined the benefits of NO<sub>x</sub> reductions with regard to the Tier 2 rule: (1) the modeling that EPA did to support the final rule, and (2) the modeling that Environ did for GM and the Alliance that they submitted as part of their comments on the Tier 2 proposal.

In expressing concerns over the Tier 2 rule's NO<sub>x</sub> reductions leading to increases in ozone levels in urban areas, GM and the Alliance also pointed to perceived problems in EPA's emissions inventories, meteorological inputs, and how the Agency configured UAM-V for its analysis to support the proposal. These issues have been addressed separately in Sections 27.4 (B) and (G)-(M) of our response to comments.

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<sup>22</sup>See Figures 3 for the results of this assessment of the differences in ozone levels between Fridays, Saturdays, and Sundays throughout the Eastern U.S.

In response to comments and a recognition of the limitations in the air quality modelling for the proposed rule, the Agency conducted additional modeling to support the final Tier 2 rule. The revisions that EPA made in its approach are described in detail in the technical support document for the air quality modeling that is in the docket for this rulemaking.<sup>23</sup> This air quality modeling covered the Eastern 37 states for 2007 and the entire U.S. for 2030.<sup>24</sup> To consider changes in ozone quality that result from Tier 2, EPA has focused on examining the results for the Eastern states. The analysis examined (1) ozone changes in metropolitan areas that we predict will experience non-attainment problems for the one-hour ozone standard in 2007 and 2030 and (2) whether any metropolitan, or rural area which we would otherwise predict would be in attainment with the one-hour standard will have exceedances of the standard in the future due to Tier 2. In 2007 and 2030, EPA's air quality modeling predicted 48 and 38 CMSAs/MSAs in nonattainment with the ozone NAAQS, respectively.<sup>25</sup>

From a national perspective, EPA found that the final Tier 2 rule substantially lowers model-predicted exceedances of the ozone NAAQS in areas that currently have non-attainment problems. In 2007, the number of exceedances in CMSA/MSAs is forecasted to decline by nearly ten percent. In 2030, the program lowers such exceedances by almost 33 percent.

Table 1 shows the types and prevalence of change that occur among the metropolitan areas from the base case. In 2007 about 60 percent (and in 2030 about 85 percent) of the areas that EPA forecasts will have exceedances in the base case have ozone air quality improvements. These summary statistics are derived from the CMSA/MSA-specific findings given in the technical support document for the air quality modeling.<sup>26</sup>

In these same metropolitan areas, the total amount of ozone above the NAAQS is forecasted to decline by about 15 percent in 2007 and by more than one-third in 2030. In the vast majority of areas, the air quality modeling predicts that the program will lower peak summer ozone concentrations for both 2007 and 2030. The reduction in daily maximum ozone is nearly 2 ppb, on average in 2007 and over 5 ppb, on average in 2030. Tables 2 and 3 shows the types and levels of changes from the base case occurring among the different CMSA/MSAs due to the Tier 2 rule.

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<sup>23</sup>U.S. Environmental Protection Agency, Technical Support Document for the Tier 2/Gasoline Sulfur Ozone Modeling Analyses, December 1999.

<sup>24</sup>EPA's modeling covered 2007, an important year for attainment demonstrations for many Eastern states and 2030, a year when the light-duty vehicle fleet covered by Tier 2 standards will have nearly turned over completely under coverage with the rules.

<sup>25</sup>The main reason for the decrease in areas in nonattainment in 2030 from 2007 is that EPA's air quality modeling in 2030 only covering two of the three ozone episodes examined in 2007 (2030 covers June and July 1995 episodes and 2007 covers these cases plus an August 1995 episode).

<sup>26</sup>The statistics given here and in the following tables are based on all areas covered by EPA's modeling, including certain areas for which the Agency is proposing to approve State one-hour ozone attainment demonstrations under specified conditions. Most of the areas predicted to have exceedances of the one-hour standard in 2007 and 2030 have had NAAQS violations in 1995-1998, although some of them have not.

**Table 1**  
**Type and Prevalence of Changes in Exceedances with the**  
**One-Hour Ozone Standard that Occur Due to the Tier 2 Rule**  
**Based on Final Rule Air Quality Modeling for Eastern CMSA/MSAs**

<b><i>Effect of Tier 2 Rule on CMSA/MSA Ozone Exceedances</i></b>	<b>Percentage of 48 CMSA/MSAs in Nonattainment in 2007 Base Case</b>	<b>Percentage of 38 CMSA/MSAs in Nonattainment in 2030 Base Case</b>
No Longer Have Any Exceedances	10 %	8 %
Lowers Number of Exceedances	52 %	76 %
No Change	31 %	16 %
Increase of One Exceedance*	6 %	0 %
More than One Exceedance Increase	0 %	0 %

\*Although there is an additional exceedance in each area, the peak ozone levels in these areas are reduced significantly.

Source: U.S. Environmental Protection Agency, Technical Support Document for the Tier 2/Gasoline Sulfur Ozone Modeling Analyses, December 1999.

**Table 2**  
**Type and Prevalence of Changes in Ozone Levels above the NAAQS**  
**for One-Hour Standard that Occur Due to the Tier 2 Rule**  
**Based on Final Rule Air Quality Modeling for Eastern CMSA/MSAs**

<b><i>Effect of Tier 2 Rule on Ozone Levels above the NAAQS</i></b>	<b>Percentage of 48 CMSA/MSAs in Nonattainment in 2007 Base Case*</b>	<b>Percentage of 38 CMSA/MSAs in Nonattainment in 2030 Base Case</b>
No Ozone Level above the NAAQS	10 %	8 %
Reduction of Ozone above NAAQS	83 %	82 %

No Change in Ozone above NAAQS	2 %	5 %
Increase of Ozone above the NAAQS	4 %	5 %

\*Numbers do not sum to 100 % due to rounding error.

Source: U.S. Environmental Protection Agency, Technical Support Document for the Tier 2/Gasoline Sulfur Ozone Modeling Analyses, December 1999.

**Table 3**  
**Type and Prevalence of Changes**  
**in Peak Ozone Levels that Occur Due to the Tier 2 Rule**  
**Based on Final Rule Air Quality Modeling for Eastern CMSA/MSAs**

<b><i>Effect of Tier 2 Rule on Ozone Peak Levels</i></b>	<b>Percentage of 48 CMSA/MSAs in Nonattainment in 2007 Base Case</b>	<b>Percentage of 38 CMSA/MSAs in Nonattainment in 2030 Base Case</b>
Reduction	90 %	84 %
No Change	8 %	13 %
Increase	2 %	3 %

Source: U.S. Environmental Protection Agency, Technical Support Document for the Tier 2/Gasoline Sulfur Ozone Modeling Analyses, December 1999.

Notably, EPA's forecasts of the future air quality implications of Tier 2 show that most nonattainment areas experience only decreases in ozone levels that are above the NAAQS and do not have any increases which would lead to exceedances. None of the current nonattainment areas are forecasted to increase their ozone levels above the NAAQS during the ozone episodes unless they are also decreasing it at other times and locations within the nonattainment area. Often metropolitan areas will have times and areas within them for which ozone levels move in each direction (decreases and increases of ozone) during the course of the episode with the net change usually resulting in a reduction of ozone concentrations. These results are displayed in Table 4 below.

By-and-large, EPA's air quality analysis shows that the Tier 2 substantially improves ozone air quality for areas predicted to have exceedances of the NAAQS in the Base Case. There are a limited number of exceptions. Table 1 shows six percent, or three areas having one additional exceedance each as the result of the Tier 2 rule in 2007. These areas are Chicago, Detroit, and New London, CT. By 2030, no areas have additional exceedances resulting from Tier 2 controls and close to 85 percent of the areas are showing improvement through reduced numbers of exceedances. Because these areas are too numerous to name here, the areas with lowered exceedances are provided

in Table 5.

**Table 4**  
**Type and Prevalence of Changes in Increases and Decreases**  
**in Ozone Levels that Occur Due to the Tier 2 Rule**  
**Based on Final Rule Air Quality Modeling for Eastern CMSA/MSAs**

<i><b>Effect of Tier 2 Rule on Increases/Decreases in Ozone Levels</b></i>	<b>Percentage of 48 CMSA/MSAs in Nonattainment in 2007 Base Case</b>	<b>Percentage of 38 CMSA/MSAs in Nonattainment in 2030 Base Case</b>
Only Increases	0 %	0 %
Only Decreases	75 %	71 %
Increase & Decrease - Net: Decrease	19 %	18 %
Increase & Decrease - Net: Increase	4 %	8 %
Increase & Decrease - Net: No Change	2 %	0 %
No Change	0 %	3 %

Source: U.S. Environmental Protection Agency, Technical Support Document for the Tier 2/Gasoline Sulfur Ozone Modeling Analyses, December 1999.

In Table 2, about five percent of the areas – Chicago and Detroit – experience increases in ozone above the NAAQS, whereas close to 95 percent of the CMSAs/MSAs lower their ozone levels that are above the NAAQS in 2007 and about 90 percent lower these levels in 2030.<sup>27</sup> Again, the areas that are benefitting from the Tier 2's lowering of ozone levels above the NAAQS are provided in Table 5. In Chicago and Detroit, there are reductions in the peak ozone levels in 2007 and 2030, but they have average increases in ozone that exceed the decreases in a portion of each area. Notably, the NO<sub>x</sub> reductions in these metropolitan areas are lowering ozone levels in other parts of the MSA and downwind.

Most importantly, this type of situation (isolated ozone increases) should not occur when other governmental actions beyond the scope of the Tier 2 rule are considered. Some states are now in the process of conducting more detailed local modeling that will consider the impacts of this rule and their own local programs that should be designed to complement this and other national programs. We expect that the states will be able to design reasonable programs to provide attainment, which means that even in the cases discussed directly above ozone levels will be reduced in the future.

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<sup>27</sup> Table 4 appears to be inconsistent with Table 2's results on ozone increases in 2030, but is not. In that year, EPA forecasts that under Tier 2, Pittsburgh will have an area (grid cell) decrease its ozone level above the NAAQS to just below the standard and have another area (grid cell) below the standard rise to just above the standard to provide the same level of ozone above the NAAQS. Therefore, there is no change in the ozone level above the NAAQS (covered in Table 2) while there is a net increase in ozone levels occurring from the reductions and increases that occur (what Table 4 covers).

For instance, the State of Illinois is developing a set of control actions that will enable the Chicago metropolitan area to reach attainment with the one-hour ozone standard. The state is considering how to implement local control programs in conjunction with federally required programs to lower ozone transport (such as the NO<sub>x</sub> SIP Call). The State is well aware that Tier 2 controls will be in place soon and considering how Tier 2 in conjunction with local actions can provide attainment. The State has not expressed concern to EPA about the program having counterproductive impacts. In fact, repeatedly in recent months the State has voiced support of the program.<sup>28 29</sup> The State is currently completing detailed local modeling of compliance programs for Chicago and accounting for Tier 2 requirements in that activity.<sup>30</sup>

The State shared with EPA some important intermediate results of its air quality modeling this Fall.<sup>31</sup> It will not be drawing final conclusions until all of its modeling is done. However, in the write up of those intermediate results, it is stated that their analysis “suggests that Tier II/Low S controls are needed to help provide for attainment of the 1-hour ozone NAAQS in the Lake Michigan area.” The State also recognizes that when it compared its base case to one with regional transport controls and Tier 2 that “there are both concentration decreases and, on a few days, concentration increases. Review of the concentration increases, however, indicates that these occur primarily on low ozone days (i.e. peak 1-hour concentrations less than 100 ppb). The increases on these days are insufficient to produce a modeled exceedance, and consequently, do not threaten the attainment demonstration.” The state also indicates that their modeling results show for the ozone decreases that occur with Tier 2 that “most of the benefit occurs in high ozone areas (i.e. we’re getting benefits where they count.)”

Connecticut has also sent EPA a letter supporting the Tier 2 program as it works to gain attainment for the greater Connecticut area. As stated earlier, no state has voiced concern over the Tier 2 standards and STAPPA/ALAPCO expressed strong support for this program. Historically, States have been vocal about EPA’s programs to address emissions when they have concerns (e.g. Michigan and other states recently sued the Agency on the NO<sub>x</sub> SIP Call.)

The Agency is also going to take further actions on both VOCs and NO<sub>x</sub> which we expect will further lead to air quality improvements. These actions include tighter standards for heavy duty diesel highway vehicles (beyond those scheduled to go into effect in 2004) and for heavy duty gasoline highway vehicles. Planned non-road programs include emissions standards for stern-drive recreational marine engines and for commercial marine engines.

## Table 5

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<sup>28</sup>Letter from Thomas Skinner, Director , Illinois Environmental Protection Agency, to EPA Administrator Carol Browner, November 4, 1999.

<sup>29</sup>Letter from Bharat Mather, Chief Bureau of Air, Illinois Environmental Protection Agency, to EPA Air and Radiation Docket, No. A-98-32, November 29, 1999.

<sup>30</sup>Personal communication between Sam Napolitano, US EPA, and Bharat Mather, Chief Bureau of Air, Illinois Environmental Protection Agency, November 12, 1999.

<sup>31</sup>Letter from Bharat Mather, Chief Bureau of Air, Illinois Environmental Protection Agency, to EPA Air and Radiation Docket, No. A-98-32, November 29, 1999 with attachment of *Midwest Subregional Modeling: 1-Hour Attainment Demonstration - Tier II/Low S Controls*.

**List of Metropolitan Areas that Have Reductions in Ozone NAAQS Exceedances  
and/or Reduction in Ozone Levels above the NAAQS in 2007 and 2030 Due to Tier 2**

<i>Metropolitan Areas</i>	Reduction of NAAQS Exceedances		Reduction of Ozone above the NAAQS	
	2007	2030	2007	2030
Atlanta	X	X	X	X
Barnstable	X	X	X	X
Baton Rouge	X	X	X	X
Benton Harbor			X	X
Biloxi	X	X	X	X
Birmingham	X	X	X	X
Boston	X	X	X	X
Buffalo		X	X	X
Canton		X	X	X
Charleston			X	
Charlotte		X	X	X
Cincinnati	X		X	
Cleveland	X	X	X	X
Grand Rapids	X	X	X	X
Hartford		X	X	X
Houma	X	X	X	X
Houston	X	X	X	X
Huntington			X	
Indianapolis			X	
Jackson	X	X	X	X
Lafayette	X	X	X	X
Lakeland	X		X	
Louisville		X	X	X
Macon	X		X	
Melbourne	X		X	
Memphis	X	X	X	X

Milwaukee		X		X
Nashville	X	X	X	X
New London		X	X	X
New Orleans	X	X	X	X
New York	X	X	X	X
Norfolk	X		X	
Orlando	X		X	
Pensacola			X	
Philadelphia		X	X	X
Pittsburgh	X		X	
Providence	X	X	X	X
Richmond		X	X	X
Rochester	X		X	X
Rockford		X	X	X
Sarasota	X	X	X	X
St. Louis	X	X	X	X
Tampa	X	X	X	X
Toledo			X	
Washington	X	X	X	X
Wheeling	X		X	
York		X		X

Source: U.S. Environmental Protection Agency, Technical Support Document for the Tier 2/Gasoline Sulfur Ozone Modeling Analyses, December 1999.

In addition to these results for areas that are predicted to have nonattainment in the Base Case, EPA found that no metropolitan or rural areas that the Agency predicts are in attainment in the base case (without Tier 2) have exceedances of the one-hour standard in 2007 or 2030 when the Tier 2 rule is in place. More details on the results of EPA's air quality modeling can be found in the TSD for the air quality modeling in the rulemaking docket.

GM and the Alliance submitted air quality modeling based on different emissions inventories. This modeling used a smaller grid size (4km) than EPA used in the Northeast, Lake Michigan, and Houston areas to address the possibility of ozone increases resulting from Tier 2 controls. EPA has some concerns over the inventories developed for this air quality modeling, as described in Sections 27.4 (G)-(M) of this Response to Comments document.

Nevertheless, the finer-grid modeling that was submitted by GM and the Alliance



shows results that are similar to what EPA modeling found using 12 km urban nested in 36 km regional grid sizes. Even though the base year inventories were substantially different and a different photochemical grid model (CAMx) was used by the commenter, EPA's review of the data submitted indicates that the decreases due to Tier 2 controls predicted by the commenter's modeling in New York, Chicago, and Houston with 4 km runs are essentially identical to the decreases (i.e., range from 1-4 ppb) predicted by EPA's 12/36 km modeling. Additionally, the spatial extent and magnitude of the limited ozone increases due to the Tier 2 controls in 2007 are very similar between the commenter's and EPA's model runs for these areas. Even more so than in the EPA modeling, most of the ozone increases in the commenter's 4 km modeling appear to occur when ozone concentrations were low (i.e., below the NAAQS) and do not result in additional exceedances. Further responses to comments on the influence of modeling grid size are contained in Section 27.4 (B) of this document.

However, EPA believes that the real issue is whether overall Tier 2 makes states and localities collectively better off in addressing the ozone problem. EPA concludes that the answer is, yes, based on the Agency's modeling results. GM and the Alliance did not try to answer this question. EPA examined the figures in the GM and the Alliance comments (showing air quality changes under Tier 2). It appears that the GM and Alliance air quality modeling results also lead to the same important answer that States and localities will be collectively better off in their efforts to address the ozone problem due to the Tier 2 rule.

#### **Evaluation of Ozone-related Health Improvements from Tier 2 NO<sub>x</sub> Reductions**

Congressman McIntosh stated that EPA should conduct a detailed analysis at the county and metropolitan area level to determine for affected populations what risks the public is facing due to the Tier 2 rule and what harmful health effects are likely to occur. One concern of Congressman McIntosh was his perception that EPA's analysis at the time of the proposal did not fully address the changes in ozone air quality that would occur due to Tier 2's NO<sub>x</sub> reductions. A related concern was the need to make the public aware of potential air quality changes in either direction associated with the Tier 2 rule.

EPA has examined all of the important changes in ozone air quality predicted to occur at the county level over the ozone season in its final analysis of the health and environmental effects of this rule. It has considered how areas experience both increases and decreases in ozone levels throughout the course of the season. The Agency has developed estimates of all the important ozone parameters that are necessary for estimating health and environmental effects at the county level. The Agency then used county population projections out to 2030 to estimate how many people will either experience, or avoid different types of health effects due to the Tier 2 rule. These results are then aggregated to come up with a national estimate of the benefits of the rule. Further details of this process can be found in the Regulatory Impact Analysis (RIA) for the final rule and the TSD for the health and welfare effects estimation process.<sup>32</sup>

EPA estimates that there will be substantial benefits to the public from the ozone reductions that result from the NO<sub>x</sub> reductions that EPA is requiring in Tier 2. As mentioned above, soon after the program's inception (by 2007), the Agency forecasts close to a 10 percent reduction in exceedances with the ozone NAAQS in the eastern US and about a 15 percent reduction in ozone levels that exceed the NAAQS. This should lead to

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<sup>32</sup>U.S. Environmental Protection Agency, Final Tier II Rule: Air Quality Estimation, Selected Health and Welfare Benefits Methods, and Benefits Analysis Results, December 1999.

fewer hospital admissions for respiratory and cardiovascular diseases, including emergency room admissions for asthma, and reduce the occurrence of nonemergency asthma attacks and other acute respiratory symptoms and minor restricted activity days. EPA's analysis of ozone reductions also indicates that there should be increases in worker productivity and other benefits to the public's welfare.

The Agency predicts that these benefits will increase annually. By 2030 (when turnover of the vehicle fleet has occurred), the Tier 2 NO<sub>x</sub> reductions will provide reductions in ozone concentrations that lead to 1,700 fewer hospital admissions for respiratory and cardiovascular diseases (including around 350 fewer emergency room admissions for asthma). There should also be an annual reduction of more than 2.2 million incidences of acute respiratory symptoms and minor restricted activity days. This includes avoidance of close to 200 thousand asthma attacks. Additionally, EPA estimates that there will be increased worker productivity valued at \$ \$ 140 million, recreational visibility improvements and reductions in crop damage valued at close to \$ 600 million dollars, and other significant, although unquantified, public health and welfare benefits. This substantial level of health and welfare benefits from ozone-related improvements in air quality clearly rebuts the

Finally, it is important to recognize that EPA has docketed the output files from its air quality modeling runs. This enables the public to examine how ozone levels changed during the modeling simulations in response to Tier 2's requirements. EPA will put the postprocessing code which ties the model output to county populations on an ftp site in the near future.<sup>33</sup> This will allow the public to develop a sense of the potential changes in ozone exposures people throughout the country could have under Tier 2. EPA based its decisions for the Tier 2 rule on the air quality modeling results summarized above and provided in detail in the Air Quality Modeling TSD. The Agency also recognized through its RIA that the rule will substantially improve the nation's public health.

**appendices to Issue 27.1. H: See end of section 27.1.**

**COMMENT I:** The proposal is important to protect the health of children, who are especially susceptible as a group to air pollution. **(Children's Environmental Health Network (IV-D-205))**

**RESPONSE:** We acknowledge and agree with this comment. We noted in the NPRM that the proposed rule is subject to Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks" (62 FR 19885, April 23, 1997).

**COMMENT J:** EPA should align its enunciated objective of reducing exposure to HAPs in urban areas with the opportunity presented under the Tier 2/low sulfur rulemaking to reduce such exposure. EPA should examine the benefits of the Tier 2/low sulfur proposal in reducing HAPs, determine whether additional reductions in HAPs are possible under the standards of the proposal, and clearly explain its findings in the final rule. **(Environmental Defense Fund (IV-D-174), p. 1-3)**

**RESPONSE:** Since most HAPs are VOCs, reductions in VOC emissions resulting from the Tier 2/Sulfur rule are also expected to reduce emissions of HAPs. We will more fully address issues related to air toxics emissions from motor vehicles and their fuels in a separate rulemaking that EPA will initiate in the near future under section 202(l) of the

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<sup>33</sup> The site address is: [ftp://www.epa.gov/pub/scram001/modelingcenter/Tier\\_2](ftp://www.epa.gov/pub/scram001/modelingcenter/Tier_2)

Clean Air Act. That rulemaking will address the emissions of hazardous air pollutants from vehicles and fuels and the appropriate level of control of HAPs from these sources. In developing our proposed and final actions under section 202(l)(2), we will consider the air toxics reductions that will be accomplished by today's rule.

**COMMENT K:** EPA fails to consider adverse health risks from sulfur reduction. EPA does not consider either comparative risks or potential indirect health effects of the proposed sulfur standard. For example, while EPA admits in the RIA supporting the proposal that a reduction in ground level ozone "is likely to increase the penetration of ultraviolet light, specifically UV-b," it claims it is not able to quantify those risks. Commenter details how a 10 ppb change in ozone levels could result in 25 to 50 new melanoma-caused fatalities, 130 to 260 incidents of cutaneous melanoma, 2,000 to 11,000 new cases of non-melanoma skin cancer, and 13,000 to 28,000 new incidents of cataracts each year. **(Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 24-25)**

**RESPONSE:** While it is possible to provide quantitative estimates of benefits associated with globally based strategies to restore the global stratospheric ozone layer, the changes in UV-B exposures associated with ground level ozone reduction strategies are much more complicated and uncertain. Smog ozone strategies, such as mobile source controls, are focused on decreasing peak ground level ozone concentrations, and it is reasonable to conclude that they produce a far more complex and heterogeneous spatial and temporal pattern of ozone concentration and UV-B exposure changes than do stratospheric ozone protection programs. In addition, the changes in long-term total column ozone concentrations due to ground-level programs are small, when considered independently. To properly estimate the change in exposure and impacts, it would be necessary to match the spatial and temporal distribution of the changes in ground-level ozone to the spatial and temporal distribution of exposure to ground level ozone and sunlight. The latter requires understanding not only of time outdoors at specific locations, but shading by building shadows and vegetation, and subject related factors. More importantly, it is long-term exposure to UV-B that is associated with effects. Intermittent, short-term, and relatively small changes in ground-level ozone and UV-B are not likely to measurably change long-term risks of these adverse effects.

For all of these reasons, it is not possible to provide reliable estimates of the changes in UV-B shielding associated with ground-level ozone changes. It is likely that any such effect would, however, be small because 1) the expected long-term ozone change resulting from this rule (average change = -0.6 ppb) is small relative to total anthropogenic tropospheric ozone, which in turn is small in comparison to total column natural stratospheric and tropospheric ozone; 2) air quality management strategies are focused on decreasing peak ozone concentrations and thus change exposures over limited areas for limited times, 3) people often receive peak exposures to UV-B in coastal areas where sea or lake breezes reduce ground level pollution concentrations regardless of strategy, and 4) ozone concentration changes are greatest in urban areas and areas immediately downwind of urban areas, where people are more likely to spend most of their time indoors or in the shade of buildings, trees or vehicles.

The study cited by the commenter has numerous problems, including the assumption of a 10 ppb uniform reduction across the U.S. The commenter did not provide any support for the claim that the proposed standards would result in a long-term spatial and seasonal average change of 10 ppb; by contrast, many commenters note the difficulty in achieving a 10 ppb O<sub>3</sub> reduction even for the 3rd highest maximum 8-hour concentration in a year, much less the long-term seasonal or annual average. As indicated above, this rule is expected to result in average reductions in ozone of only 0.6 ppb, less than a tenth of the postulated change. See also response to Issue 34.F.

**COMMENT L:** The proposal will help reduce toxic emissions from mobile sources, which EPA estimates account for 41% of all man-made toxic emissions and up to 1,500 cases of cancer/year. The NMOG standard will help reduce these toxic emissions. **(Massachusetts Dept. of Environmental Protection (IV-D-137), p. 3)**

**RESPONSE:** We acknowledge the comment and agree that the NMOG standard will help reduce toxic emissions, although we do not agree with the implication that NMOG emissions from cars and light trucks account for up to 1,500 cancer cases per year. The commenter claims that this estimate comes from an EPA study but does not provide a specific reference. Our analysis indicates that the commenter's claim of 1,500 cancer cases per year resulting from mobile sources includes the estimated cancer risk from diesel PM (essentially all of which is emitted by sources not covered by the Tier 2/Sulfur program) based on a potency for diesel PM similar to that estimated by the California Air Resources Board. We have not yet completed our own assessment of the cancer potency of diesel PM, but regardless of the outcome of this assessment, we are confident that the cancer risk associated with emissions from cars and light trucks would be only a few percent of the 1,500 cases per year implied by the comment, as discussed in Chapter III.F of the Regulatory Impact Analysis.

Nonetheless, we remain concerned about the cancer risk associated with light-duty emissions. We believe that the more stringent VOC standards contained in the Tier 2/Sulfur rule will help reduce the cancer risk associated with gaseous air toxics from cars and light trucks, and we also believe that the more stringent PM standards will help reduce the cancer risk associated with diesel PM emissions from cars and light trucks. We will more fully evaluate these risks, and the steps that could be taken to mitigate them, in our rulemaking under Section 202(l).

#### **ISSUE 27.1.H: Appendices**

Figure 1: Long-term trends in Ozone and Emissions: Reductions in ozone maxima for L.A. Basin occur during a period of reductions in NO<sub>x</sub> (and VOC) emissions.

Figure 2: Ambient trends in L.A. Basin suggest morning NO<sub>x</sub> and VOC (mobile related) emissions have decreased significantly over the period of declining ozone.

Figure 3: Findings of Regional Weekday/Weekend Effect in OTAG by Husar.

These figures follow.

**Color files for these figures in LOTUS Freelance are downloadable from the EPA Office of Mobile Sources Web Site. Filename RTCAPP271H.**

## **Issue 27.2: Environmental Concerns**

**COMMENT A:** The implementation of the Tier 2 standards are important for mitigating the threat of global warming. (**Alliance for a Sustainable Future (Philadelphia - Day 2) (IV-F-131), Blackbrook Audubon Society (IV-F-104), Campaign on Auto Pollution (IV-F-44), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Climate Solutions (IV-D-279), Gibson, David E. (IV-F-17), Group Against Smog and Pollution (IV-F-45), League of Women Voters (IV-D-213), League of Women Voters - La Grange Area (IL) (IV-D-169), National Environmental Trust (IV-F-26), Ohio Local Air Pollution Control Officials Association (IV-F-97), Whiteford, R. (IV-F-51))**)

**RESPONSE:** As is stated in our response to 27.2(E), we expect global climate impacts of this rule to be minimal.

**COMMENT B:** The implementation of the Tier 2 standards are important to mitigate the adverse environmental effects of airborne nitrogen (and other pollutants), which is contributing to the deterioration of the environment and the acidification of waterways and soils. (**American Lung Association (IV-D-167), p. 1, American Public Health Association/Sierra Club (IV-D-86), Appalachian Mountain Club (IV-D-251), Appalachian Voices (Atlanta) (IV-F-132), Brock, Kathryn (Cleveland) (IV-F-134), Colorado Public Interest Group (Denver) (IV-F-133), Environmental Defense Fund (Denver) (IV-F-133), Group Against Smog and Pollution (IV-F-45), Maslin, Mindy (Philadelphia - Day 2) (IV-F-131), Mountcastle, Brooks (Philadelphia - Day 2) (IV-F-131), National Park Service (IV-D-135), National Park Service (IV-F-121), Ohio Local Air Pollution Control Officials Association (IV-F-97), Regional Air Quality Council (IV-D-134), Rohm and Haas, Agricultural Chemicals Division (IV-F-25), STAPPA/ALAPCO (IV-D-67), p. 1-2, STAPPA/ALAPCO (IV-F-117), Sierra Club (IV-F-49), Sierra Club (Philadelphia - Day 1) (IV-F-131), Sierra Club, Utah Chapter (IV-F-116), Tennessee Environmental Council (Atlanta) (IV-F-132), Wyncote Audubon Society (IV-F-8)**)

**RESPONSE:** We acknowledge and agree with this point. The benefits of decreased nitrogen deposition as a result of Tier 2/Sulfur will be addressed in the cost-benefit analysis for the final rule. The effect will be quantified (i.e., we will estimate the decrease in nitrogen deposition as a result of Tier 2/Sulfur), but it will not be monetized (i.e., we will not estimate the dollar value of this decrease). If we were to quantify this benefit, it would not alter our decisions regarding NO<sub>x</sub> standards, since these decisions were based on technological feasibility.

**COMMENT C:** The implementation of the Tier 2 standards is an important component to mitigating the environmental threat of increasing VMT and NO<sub>x</sub> emissions that results from urban sprawl. One of these commenters notes that mobile sources remain a critical source of pollution because of trends toward increased VMT and reliance on higher polluting SUVs. (**Cornicelli, David (Cleveland) (IV-F-134), EcoCity Cleveland (IV-F-84), Galik, D.S. (IV-F-79), Union of Concerned Scientists (IV-D-195), p. 2**)

**RESPONSE:** EPA acknowledges and agrees with this point. The Tier 2/Sulfur rule will mitigate the increased NO<sub>x</sub>, VOC, CO, and air toxics emissions that would otherwise result from VMT growth, which is in part driven by urban sprawl.

**COMMENT D:** EPA may not establish a need for the Tier 2 standards based on concerns regarding air toxics and welfare effects such as visibility, acid rain, and eutrophication since

the need should be based on attainment of the NAAQS as stated in section 202(i) of the CAA. **(General Motors Corporation (IV-D-209), vol. 1, p. 29; vol. 2, p. 64)**

**RESPONSE:** EPA did not establish the need for the Tier 2 standards based on these concerns. The primary basis for the Tier 2 standards are the ozone and PM NAAQS. It may, however, legitimately account for the full range of welfare effects in its benefit analysis. EPA is not restricted from evaluating the concerns listed above in promulgating standards under section 202(a) or (b) which, unlike section 202(i), are not restricted to review based on the NAAQS. For a more complete discussion of EPA's legal authority in the Tier 2/Sulfur rulemaking, see the response to Issue 1 and Comment 27.1.G.2, above.

**COMMENT E.1:** Recent evidence regarding global warming temperatures suggests reduction in fuel sulfur, even in minor amounts, in fact increases global warming temperatures due to the loss in the radiative cooling effect of sulfur based aerosols. EPA should fully evaluate this issue and determine whether refiners may be penalized for CO<sub>2</sub> increases under the Tier 2/Sulfur program or if the Kyoto treaty is implemented. Congressman Tancredo and the National Alternative Fuels Association provide additional discussion regarding this issue and cites to the following as supporting documentation: The Science of Climate Change, Global and U.S. Perspectives, The National Center for Atmospheric Research/ Pew Center on Global Climate Change, dated June 29, 1999. The following questions are also posed to EPA: Would EPA support immediate tests to confirm or deny the allegations made by the Pew Center and to generate statistically significant evidence to confirm or deny that a readily available additive technology exists capable of achieving Tier 2 NO<sub>x</sub> emission standards at present sulfur levels, absent catalyst degradation?; Has EPA considered the effect of phosphorus poisoning caused by engine oil contamination in Tier 2 engine and catalyst operation?; and Would EPA be willing to delay implementation until these matters have been resolved? **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Inhofe Questions, p. 2, National Alternative Fuels Association (IV-D-277), Tancredo, T. (IV-D-255)) (See other letter listed under Comment E.2. that follows.)**

**RESPONSE:** As noted above, the primary basis for the Tier 2 standards are the ozone and PM NAAQS. While EPA is aware of the Pew report as well as earlier work indicating a connection between sulfur dioxide emissions and the rate of global warming, we do not believe this issue bears substantially on the proposed reductions in fuel sulfur for passenger cars and light trucks. On a separate path, EPA will continue to follow developments in the science of global climate change, including the work of the Pew Center.

Of all U.S. sources of oxides of sulfur (SO<sub>x</sub>) emissions, the light-duty vehicles and trucks addressed by our proposal represent a small fraction -- less than 2 percent. While our proposed program would reduce this fraction substantially (by about 90 percent), the absolute reduction in overall SO<sub>x</sub> will be small relative to all sources. It appears that such a small change in overall U.S. SO<sub>x</sub> emissions would not be likely to make a significant difference in projected global warming trends.

Further, the Intergovernmental Panel on Climate Change has stated that sulfate cooling is not a straightforward offset to CO<sub>2</sub> warming. This is because CO<sub>2</sub> concentrations are globally very uniform (due to the long lifetime of CO<sub>2</sub> in the atmosphere) while sulfate concentrations differ considerably from region to region because sulfates are relatively short-lived in the atmosphere. Even if the direct radiative forcings of CO<sub>2</sub> warming and sulfate cooling were to cancel one another out over a certain region, it does not mean that the region would be protected from climate changes caused by the net warming of the global atmosphere.

On the other hand, as discussed elsewhere, reductions in gasoline sulfur will result in considerable quantifiable health benefit, which would be sacrificed under the commenter's plan. Sulfur control in gasoline is a necessary component of any new standards for control of emissions from light-duty vehicles and trucks, given the effects that fuel sulfur has on vehicle control equipment. The commenter provides no data to show that such effects can be prevented, and there is considerable evidence to the contrary.

As we said in our original answer to Senator Inhofe, the projected increases in CO<sub>2</sub> emissions associated with process changes to meet the Tier 2/Sulfur program's gasoline sulfur standards are small relative to total U.S. carbon emissions and U.S. carbon emissions associated with transportation activities. In addition, refiners may choose to use one of the adsorption desulfurizing technologies recently announced by Black and Veatch and Phillips Petroleum, which are lower in carbon emissions. We have not, as commenters suggest, required reductions in greenhouse gas emissions to offset any increase in refinery CO<sub>2</sub> emissions as part of the Tier 2/Sulfur program. Furthermore, the Administration has made no policy determination as to how a program to reduce domestic greenhouse gas emissions would be structured, if the Kyoto protocol were ratified after Senate advice and consent. Thus, it is premature at this time to determine the impact such a program might have on refiners.

We believe that the concerns raised by the commenters regarding phosphorous have been addressed by the automobile and fuel industries by limiting phosphorous levels, and we do not believe it is necessary to address that issue in this rule.

**COMMENT E.2:** Desulfurization will permanently increase global warming emissions and the RIA provides too low an estimate of these impacts. **(National Petrochemical and Refiners Association (IV-D-118), p. 78)**

**RESPONSE:** The commenter's claim that there will be increased global warming resulting from the Tier 2 program is not supported by the scientific literature (See response provided above for Issue 27.2(E)(1)). We are also unaware of any alternative control technologies that could achieve Tier 2/Sulfur emission standards at present sulfur levels.

**COMMENT F:** The proposal will assist in reducing regional haze problems. **(Environmental and Energy Study Institute (IV-D-283), Oregonians for Clean Air (IV-D-202), Senate Hearing Materials (IV-D-228), DaimlerChrysler statement, p. 2, National Park Service (IV-D-135), p. 2)**

**RESPONSE:** We acknowledge and agree with this point. The haze-reduction benefits of Tier 2/Sulfur are discussed in the environmental impacts discussion in the preamble and RIA and are reflected in the benefit-cost analysis.

### **Issue 27.3: Individual Pollutants**

**COMMENT A:** Tier 2 should include standards for PM<sub>2.5</sub> in addition to standard for non-methane hydrocarbons, NO<sub>x</sub> and CO. (**STAPPA/ALAPCO (IV-D-67), att. 2, p. 3, STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77)**)

**RESPONSE:** The Tier 2/Sulfur rule includes more stringent PM standards. These standards are for PM in general and not for PM<sub>2.5</sub>. Since essentially all of the PM emitted from cars and light trucks is PM<sub>2.5</sub>, however, the Tier 2 PM standards effectively constrain PM<sub>2.5</sub> emissions.

**COMMENT B:** EPA's proposal should tighten carbon monoxide standards to cover all SUVs and passenger cars. (**City of Fort Collins (IV-F-125)**)

**RESPONSE:** The Tier 2/Sulfur rule tightens the CO standard for cars and light trucks and will, for the first time, require all cars and light trucks to meet the same standards, although the phase-in period is longer for trucks. We believe that this action is sufficient to enable the remaining CO nonattainment areas to attain the CO NAAQS and ensure that the recent reductions in CO levels are sustained.

**COMMENT C:** EPA should tighten PM standards, particularly for diesels. (**Bell, S. (IV-F-89)**)

**RESPONSE:** The Tier 2/Sulfur rule tightens PM standards for all cars and light trucks, including those powered by diesel engines.

**COMMENT D:** A study has found high levels of ammonia emissions from vehicles operated on low sulfur gasoline and alternative fuels. Ammonia exhaust emissions are not routinely monitored or regulated by EPA. These facts must be addressed in the Tier 2 rulemaking, especially in light of the recent NAAQS decision that required EPA to evaluate disbenefits in its analyses. One of the commenters provides article from "Octane Week" which concludes that the reaction between ammonia and nitric acid forms ammonium nitrate, which accounts for as much as 50 percent of ambient PM 2.5 in urban areas. (**American Petroleum Institute (IV-D-114), p. 147-148, Exxon Company, USA (IV-D-119), p. 4, Marathon Ashland Petroleum LLC (IV-D-81), p. 24-25, National Petrochemical and Refiners Association (IV-D-118), p. 14, 77, Sunoco, Inc. (IV-D-73), p. 8, 39-40), National Petrochemical and Refiners Association (IV-D-217), all pages**)

**RESPONSE:** We are concerned about the potential for increased ammonia emissions from vehicles operating on low-sulfur gasoline. However, the finding referred to by the commenters is very preliminary. This view is shared by the University of California researcher to whose study the commenter refers. The researcher was quoted in Octane Week as saying, "We have not determined a sulfur-ammonia connection, but we have begun to investigate the issue. It is too early to make sweeping conclusions based on limited data. It may be possible to simply modify the control strategy to reduce the ammonia emissions."

Furthermore, we believe this study is not relevant to Tier 2 compliant vehicles. As cited in the comments, the chief mechanism associated with the formation of ammonia appears to be rich operation in certain catalyst temperature ranges. This is evident in the data submitted by the commenter, which shows large increases in ammonia emissions on the



US06 test cycle. However, such rich excursions will be dramatically changed by the advent of SFTP compliant vehicles, rendering the vehicle used to generate the reported data inappropriate for drawing conclusions about Tier 2 vehicles. Such operation would be unacceptable for Tier 2 vehicles, rendering them incapable of meeting the Tier 2 NO<sub>x</sub> standards. Future vehicles will use control strategies and catalyst formulations which differ from the vehicle used to generate the data submitted by the commenters in ways which should act to prevent increased ammonia emissions. Thus, the report does not give any clear evidence that Tier 2 vehicles operated on low-sulfur fuel will produce increased ammonia emissions compared to NLEV, Tier 1, or Tier 0 vehicles operating on higher sulfur fuel.

Finally, whether additional ammonia emissions would result in an increase in secondary PM depends on specific local conditions (for example, areas in which secondary PM formation is not limited by ammonia levels would not see an increase in secondary PM due to increased ammonia emissions). Given these uncertainties, we do not believe the issue raised by the commenter warrants any changes in the Tier 2/Sulfur program.

**COMMENT E:** VOC reductions, along with NO<sub>x</sub> reductions, will be beneficial in addressing ozone nonattainment issues and will help reduce air toxics found in gasoline. **(Ozone Transport Commission (IV-D-112), p. 3, SC Department of Health and Environmental Control (IV-D-56), p. 2)**

**RESPONSE:** We acknowledge this point and agree with it. The Tier 2/Sulfur proposal includes more stringent standards for both exhaust and nonexhaust VOC emissions, as well as more stringent standards for NO<sub>x</sub> emissions.

**COMMENT F:** Lower CO standards are not justified since there have been continued improvements in ambient CO levels in recent years. EPA notes in the RIA that ambient CO levels have been dramatically improved because of the progress made in vehicle emissions. However, the RIA fails to point out that continued progress in ambient CO levels is expected as older vehicles are replaced with Tier 1 and NLEV vehicles. These reductions will happen even without further reductions in CO under the Tier 2 rule. EPA has not performed any needs assessment for further CO reductions and should conclude that new CO standards are unnecessary. **(DaimlerChrysler (IV-D-59), p. 2-3) Koch Petroleum Group, LP (IV-D-72), p. 45)**

**RESPONSE:** We believe that the more stringent CO standards in the Tier 2/Sulfur proposal are warranted. While CO concentrations have trended downwards over the last several decades, there are still areas of the country which experience violations of the CO standard, as discussed in the RIA; these areas will benefit from the more stringent CO standards in the Tier 2/Sulfur proposal. The more stringent standards also will benefit those areas trying to maintain attainment of the CO standard in the face of rapid VMT growth.

**COMMENT G:** Tier 2 engines may have difficulty meeting the formaldehyde (HCHO) standard when burning reformulated gasoline containing oxygenates and oxygenated gasoline. **(Koch Petroleum Group, LP (IV-D-72), p. 45)**

**RESPONSE:** We do not believe this comment is relevant to the matter of setting emission standards for Tier 2 vehicles, since the certification fuel used for engine testing is not reformulated and does not contain added oxygenates. For this reason, we do not believe

that Tier 2 engines will experience elevated formaldehyde emissions due to fuel composition during certification testing.

We acknowledge that oxygenated gasolines can result in increases in aldehyde emissions. However, our evaluation of the effect of oxygenates on the amount and composition of vehicle emissions shows that oxygenated gasolines result in lower overall air toxics health risks despite the increase in aldehyde emissions, since oxygenated gasolines emit lower levels of other, more problematic air toxics.

**COMMENT H:** EPA should impose vehicle CO<sub>2</sub> limits so that the proposal would result in CO<sub>2</sub> emission reductions. **(International Center for Technology Assessments (IV-D-122), p. 10-11)**

**RESPONSE:** The objective of the Tier 2 rulemaking is to reduce precursor pollutants to ozone and PM. Therefore, EPA is not promulgating CO<sub>2</sub> standards currently for vehicles, but may consider this pollutant in a future action on this issue.

#### **Issue 27.4: Emissions Modeling**

**COMMENT A.1:** EPA overestimates future exposure levels (to CO, NO<sub>x</sub>, PM<sub>10</sub>, ozone) and the potential for an increase in nonattainment areas. EPA's claim that the nation's air quality will continue to expose tens of millions of Americans to unhealthy levels of air pollution in the absence of new controls on mobile source emissions, is flawed. AAM and GM both emphasize the improvements in air quality that have been achieved in recent years. AAM and GM cite to EPA's Annual Trends Report which summarizes major reductions in criteria pollutants that have been achieved throughout the past several decades and notes that the number of people residing in counties exceeding the CO, NO<sub>2</sub>, ozone, or PM<sub>10</sub> standards has declined. For PM<sub>10</sub>, EPA documents a 26% decline in mean PM<sub>10</sub> over the past decade at 845 monitoring sites across the country but then states that "...by 2010, 45 areas, with 18 million people will be in nonattainment for the original PM<sub>10</sub> NAAQS." EPA offers no justification for this claim of a massive increase in PM<sub>10</sub> over the next decade when the on-going current control program for motor vehicles will continue to decrease emissions until at least 2015, even with growth in VMT. EPA also projects massive nonattainment for the 1-hour ozone standard despite continued improvements in many large urban nonattainment areas [see Issue 27.4, Comment E.1]. AAM and GM both make reference to the mismatch between the progress observed in actual monitoring data and the progress projected with EPA's emission inventories. For example, for CO and PM<sub>10</sub>, EPA concludes that emissions have decreased 25% and 12%, respectively, between 1988 and 1997, but that air quality has improved 38% and 26%, respectively in that same time period. If the current inventory techniques are underestimating historical improvements, they will likely underestimate the future improvement. EPA should address this issue since there may be a fundamental flaw in the projection methodology or the spatial distribution of the growth may be spreading the emissions over a wider area so that ambient concentrations are being reduced substantially faster than the emission projections would predict. This flaw undermines EPA's general claim for massive future nonattainment. **(Alliance of Automobile Manufacturers (IV-D-115), p. 19-22, General Motors Corporation (IV-D-209), vol. 2, p. 1-3)**

#### **RESPONSE:** Ozone Issues

Ozone issues are addressed in the response to Issue 27.4(A)(2), below.

#### Predictions of PM<sub>10</sub> Attainment

The fact of a recent downward trend in PM<sub>10</sub> emissions and concentrations cannot be relied upon for conclusions that emissions and concentrations will continue to decrease sufficiently absent new controls. To make predictions of future emissions and nonattainment requires emission inventory calculations that take into account current emissions, expected control through adopted regulations, and growth in activity.

EPA did explain in the preamble to the NPRM and in the first supplemental notice how it arrived at the prediction that 45 counties would violate the PM<sub>10</sub> standard in 2010, by referencing the NAAQS RIA where the prediction was first made. The specific method used to project that 45 areas with 18 million people will be in nonattainment for the original PM<sub>10</sub> NAAQS in 2010 was the Climatological Regional Dispersion Model Source-Receptor Matrix model. This model is based on emission inventory projections that account for expected controls and activity growth. The model and the application of it that yielded the prediction of 45 counties was described in the RIA for the revision of the PM NAAQS, and was referenced accordingly in the Tier 2 NPRM.

This same type of analysis has been repeated using the final Tier 2 emission inventory estimates, for the year 2030. However, EPA has re-considered the use of this approach

for determining whether areas now in attainment will come into nonattainment, and has decided that the characterization of an area as highly likely to be in  $PM_{10}$  nonattainment in the future should be reserved for areas that are presently nonattainment and which are also predicted to be in future nonattainment by the Source-Receptor model. The Source-Receptor Matrix modeling incorporates adjustment factors designed to make the model reproduce the observed 1995 (in the east) or 1996 (in the west)  $PM_{10}$  annual concentration at each monitor. The nominal test of future attainment is then based on a projection of this value using changes in emission inventories to adjust it up or down. This introduces an inconsistency with the three-year form of the NAAQS. In addition, if these years' monitoring data was influenced by monitoring upsets or one-time natural events, the effect is to project these influences into the future. By also requiring that an area be violating in the three-year period of 1996 to 1998, we avoid the issue of inconsistency with the form of the NAAQS and the influence of any unique events in 1995 or 1996. This is the approach taken in the final RIA and preamble. We believe that there is some risk of future nonattainment by other areas as well, particularly areas that are presently not far below the NAAQS. Tables III.C-3 and III.C-4 in the preamble listed these 18 areas. This risk is especially significant if one projects an increase in the sales of diesel cars and light trucks.

#### CO and $PM_{10}$ Trends

The commenter states that current air quality for CO and  $PM_{10}$  is better than EPA models project, and that therefore EPA models are not reliable. However, EPA has not put forth projections of circa-1997 CO or  $PM_{10}$  attainment on a national scale in this rulemaking or previous to it. Therefore, there is no contradiction between modeling predictions and recent ambient observations for CO and  $PM_{10}$ . Attainment trends up to this date are therefore not a reason by themselves to doubt the predictions of 2010 or 2030 nonattainment that have been made with our current air quality models, a claim seemingly intended to be put forward by commenters.

EPA does not employ models for either CO or  $PM_{10}$  that would assume that monitored air quality concentrations track national emissions changes on a percentage-for-percentage basis, so an observation that monitored changes in CO or  $PM_{10}$  concentrations have not matched estimated national emission inventory changes on such a basis does not by itself impugn the modeling methods which EPA does employ. As a first approximation, ambient concentrations of unreactive pollutants like CO and  $PM_{10}$  at any given point are the sum of the contributions from each emission source within a transport range, and the contribution from any one source can be treated to be proportional to its mass of emissions. However, nearby sources play a larger role than far away sources. All of our air quality models adhere to this basic principle. In the Source-Receptor Matrix approach to modeling  $PM_{10}$  concentrations, emission changes for counties near the receptor representing a given county dominate the prediction of  $PM_{10}$  changes at the receptor. Since the emission trend for a given pollutant can vary widely from area to area, the change in national emissions from year-to-year is not a direct indicator of the emissions trend for the sources near any given monitor.

The lack of agreement between national emissions trends and local monitored CO concentrations on a percentage-to-percentage basis is real. It may be due to the phenomenon noted by the commenters, namely that within an overall picture of decreasing national CO emissions due to fleet turnover outstripping VMT growth, there may be relatively more decline in areas near monitors because VMT growth in such areas may be growing less rapidly due to pre-existing congestion and more slowly expanding roadways. A similar situation may well exist for  $PM_{10}$ , since at least in some areas monitored  $PM_{10}$  concentrations are caused by nearby sources that have been subject to localized control precisely for the purposes of achieving attainment at the monitors. National  $PM_{10}$  emissions trends include the more constant or even increasing  $PM_{10}$  emissions taking

place in PM<sub>10</sub> attainment areas and unclassified areas, where there are fewer controls in place to achieve reductions or prevent growth. Again, however, this is not proof against the adequacy of EPA's air quality models. EPA (and all other) air quality models take account of the spatial location of emissions.

Further, the cited estimates of CO and PM<sub>10</sub> emission changes between 1988 and 1997 are not highly certain, because at least some parts of the estimates for 1988 were created with assumptions, data sets, and models that have been updated for 1997 without 1988 emissions having been re-calculated on a consistent basis. When we have added emission estimates for a new year to the time sequence of national emissions, we have not always been able to re-calculate all the estimates made for previous years when those years were the new year being added. So, for example, the estimates for 1988 were made with a method for estimating nonroad engine emissions that is now obsolete.

**COMMENT A.2:** EPA projects nationwide NO<sub>x</sub> emissions have only declined 1% between 1988 - 1997, while VOC emissions declined 20%. Since ozone levels have clearly been declining, it appears that VOC reductions have led to much of the reductions in ozone levels over this time period and may continue to lead to further ozone reductions. However, EPA assumes for purposes of the Tier 2 rulemaking that VOC reductions are not effective in reducing ozone except in a small number of locations. EPA must address this discrepancy before issuing a final rule to ensure that the potential impact of VOC reductions on future ozone levels is fully examined and is not underestimated. (**Alliance of Automobile Manufacturers (IV-D-115), p. 19-22, General Motors Corporation (IV-D-209), vol. 2, p.3**)

**RESPONSE:** While EPA's Annual Trends Report does point to an overall decrease in the number of ozone nonattainment areas over the past decade, there are indications that the downward ozone trend has ceased or at least slowed in many areas. EPA has analyzed ambient ozone data for dozens of large metropolitan areas over the past decade. Accounting for short-term meteorological variations, it appears that while many areas experienced ozone decreases during the period from 1988-1993, the trend has been flat or slightly rising over the 1993-1998 period. An area-by-area analysis of meteorologically adjusted ozone trends through 1998 is given in a December 1999 memo by William Cox of EPA's Office of Air Quality Planning and Standards, which has been placed in the docket.

The cited estimates of VOC and NO<sub>x</sub> emission changes between 1988 and 1997 are not highly certain, because at least some parts of the estimates for 1988 were created with assumptions, data sets, and models that have been updated for 1997 without 1988 emissions having been re-calculated on a consistent basis. Further, these estimates of national emissions are aggregated from state or EPA estimates of local emissions. The estimates for areas smaller than the entire country vary considerably in how 1988 compares to 1997, due to differences in source mix and control programs from area to area. The numbers that GM cites from the EPA Trends Report for reductions in NO<sub>x</sub> and VOC emissions are nationwide decreases observed between 1988 and 1997. When looked at on a more limited geographical basis and with consistent estimation methods, there can be much better agreement between ozone trends and emissions trends, as discussed below.

EPA has re-calculated the change in typical summer day emissions from 1990 to 1996 over individual nonattainment areas using consistent inventory methodologies. According to the totals in the National Emissions Trends (NET) data base, urban VOC emissions (Washington D.C., Baltimore, Philadelphia, New York, Hartford, and western MA) have fallen 15.1 percent in the Northeastern U.S. while NO<sub>x</sub> emissions have decreased by 14.1 percent over the same area. The Northeastern U.S. is the location of much of the ozone improvement trend cited by the commenters. Thus, the apparent disparity cited by the

commenter is not present at least in the Northeast.

EPA has not "assumed" that VOC emission reductions are not effective in reducing ozone concentrations. We have said that VOC reductions have less of an effect on long distance contributions to downwind ozone problems than do NO<sub>x</sub> emissions of a similar magnitude. We have concluded based on ozone model predictions and observational based methods (specifically the Measurement-based Analysis of Planned Preferences in Emission Reductions, which is based on the "extent" of the ozone reactions) that in most areas both VOC and NO<sub>x</sub> reductions will reduce ozone peaks. Commenters draw attention to weekday-weekend studies as a type of observational analysis, asserting that some studies indicate that NO<sub>x</sub> reductions will be counterproductive. Our response to issues related to that type of study is addressed in our response to Issue 27.1 H. The evidence suggests that local NO<sub>x</sub> reductions will be effective in reducing ozone levels in most areas. This indicated by all or nearly all modeling applications covering a multi-state domain, and by observational based methods as well. See, for example, the memo "Corroborative Evidence for Pursuing Effective Ozone Precursor Emissions Reductions in the U.S.," J. David Mobley, October 6, 1999.

Even if it were established that past VOC reductions have led to ozone reductions, with nearly constant NO<sub>x</sub> emissions, this would not contradict a model- and observation-based prediction that NO<sub>x</sub> reductions in the future will yield ozone reductions.

**COMMENT B.1:** The shift in emphasis to NO<sub>x</sub> control in the Tier 2 rule may not be as effective at reducing ozone levels as EPA predicts since the use of OTAG/NO<sub>x</sub> SIP Call modeling may not be providing an accurate prediction of the effectiveness of the proposed NO<sub>x</sub> reductions. AAM notes that the shift in emphasis to NO<sub>x</sub> control represents a major change from the historic strategy of controlling VOC emissions to a greater extent than NO<sub>x</sub> emissions and should be examined carefully in light of current information on ozone formation and the progress that has been made in reducing ozone. AAM and GM both provide a significant amount of discussion and analysis related to ozone formation, isopleth diagrams, areas that are likely to be VOC-limited (i.e. areas where NO<sub>x</sub> reduction may lead to an increase in the level of ozone), and notes that EPA's dependence on the OTAG/NO<sub>x</sub> SIP Call modeling system leads to a underestimation of potential VOC-limited areas and the NO<sub>x</sub> disbenefits that would occur in these areas. AAM and GM note two major problems with the OTAG modeling system that make it inappropriate to use to evaluate local attainment issues: grid size and biogenic emissions. The grid size used is larger than that required for local attainment modeling and is known to bias the result to make NO<sub>x</sub> reductions appear more favorable than they actually are. GM notes that the coarse 36/12-km grid spacing used in the OTAG databases far exceeds the maximum grid spacing allowed (5 km) in EPA's guidance for regulatory 1-hour ozone attainment demonstration modeling.

With respect to biogenics, a comparison of the isoprene predictions from the OTAG modeling system with observed isoprene concentration showed significant overprediction. EPA should conduct a thorough analysis of these issues and should consider the use of observational models (i.e. weekday/weekend comparisons) to evaluate the potential for NO<sub>x</sub> disbenefits as well as the accuracy of the OTAG/NO<sub>x</sub> SIP call modeling system at predicting the benefits of NO<sub>x</sub> reductions. AAM and/or GM cite to the following as supporting documentation: comments of the American Automobile Manufacturers Association to the U.S. EPA, Docket A-96-56, dated 3/9/98; Review of Recent Ozone Measurement and Modeling Studies in the Eastern U.S." Morris, R., ENVIRON International Corporation, dated 3/96; ENVIRON report to AAMA, dated 10/97; the North American Research Strategy for Tropospheric Ozone (NARSTO) Synthesis Team Draft dated 12/3/98; Characterization of Ozone Episodes in the South Coast Air Basin: Effects of

Air Parcel Residence Time and Weekend/Weekday Differences, W. Blier and A.M. Winer, Final Report to CARB, dated 6/96; Analysis of Weekend-Weekday Differences in Ozone and Ozone Precursors in the South Coast (LA) Air Basin, T. Stoeckenius, A. Taylor, G. Yarwood, and K. Lee, ENVIRON -prepared for AAMA, dated 7/98; A Characterization of the Weekday-Weekend Behavior of Ambient Ozone Concentrations in California, Air Resources Board, Planning and Technical Support Division, dated 1999; APCA Paper, Lawson Altshuler; and the STI report to EPA. **(Alliance of Automobile Manufacturers (IV-D-115), p. 22-28, General Motors Corporation (IV-D-209), vol. 2, p. 9-11, 31-53)**

**RESPONSE:** The emphasis on NO<sub>x</sub> control in the Tier 2/Gasoline Sulfur program is consistent with recent standards setting actions for mobile sources, for example the NO<sub>x</sub> standards for heavy-duty diesel vehicles that take effect in 2004, and with our recent actions to reduce the impact which NO<sub>x</sub> emissions in one state have on downwind states. Reductions in both VOC and NO<sub>x</sub> should be pursued as opportunities for feasible and cost-effective control are identified that would assist areas to attain and maintain.

Commenters argue that the modeling system used by EPA at proposal is too sensitive to NO<sub>x</sub> reductions and not sensitive enough to VOC reductions. The arguments and evidence advanced to support this claim are insufficient to do so, particularly with respect to the modeling system used to support the final rule.

The Tier 2/Gasoline Sulfur modeling system differs from the OTAG/NO<sub>x</sub> SIP Call modeling referred to in the comment in that the vertical structure of the atmosphere has been more highly resolved, different episode days are being modeled, baseline emission inventories have been updated to take into account the latest EPA understanding of mobile source emissions (nonroad emissions, heavy duty diesel defeat device, etc.), and the meteorological inputs to the model have been improved. Statements made about the capabilities of the OTAG modeling system do not apply to the modeling system used in the final Tier 2 analysis.

#### Grid Cell Size

EPA believes the chosen 12 km resolution in the Tier 2/Gasoline Sulfur fine grid modeling is sufficient for the intended use of the model: 1) an assessment of the national need for additional emissions reductions to meet the ozone NAAQS recognizing that any risk of overinclusion for an area is offset by a risk of underinclusion, and 2) a determination of the impact of the Tier 2/Gasoline Sulfur strategy. (EPA's requirement for grid resolutions of 5 km or less in the guidance on one-hour attainment demonstration modeling is relevant only for modeling applications focused on a determination of the precise amount of emissions reductions needed to demonstrate attainment.) The adequacy of the 12km grid resolution for these purposes is supported by the following independent evidence.

First, the finer-grid (4km) modeling that was submitted by GM shows results that are similar to what EPA found using 12/36km modeling. Even though the base year inventories were substantially different and a different photochemical grid model (CAMx) was used by the commenter, EPA's review of the data indicates that the decreases due to Tier 2/Gasoline Sulfur controls predicted by the commenter's modeling in New York, Chicago, and Houston with 4km runs are essentially identical to the decreases (i.e., 1-4 ppb) predicted by EPA's 12/36km modeling. Additionally, the spatial extent and magnitude of the limited ozone increases due to the Tier 2 controls in 2007 are very similar between the commenter's and EPA's model runs for these areas. Even more so than in the EPA modeling, most of the ozone increases in the commenter's 4km modeling appear to occur when ozone concentrations were low (i.e, below the NAAQS) and do not result in additional exceedances.

Second, EPA compiled information regarding the effects of grid cell size on relative reduction factors (i.e., the ratio of control ozone to base ozone predicted by the model) from other modeling applications. A UAM-V exercise over the Lake Michigan region found that relative reduction factors (in modeled 8-hour maxima) were generally within four percent when 12km and 4km results were compared. Additional modeling results submitted by LADCO (November 10, 1999, docket item IV-G-52) also indicate that model response to regional controls was not highly sensitive to grid resolution between 12 and 4 km. Most of the areas which EPA has characterized as certain or highly likely to require further reductions in order to attain and maintain are within the 12 km portion of the OTAG modeling system, or the EPA finding is based on or confirmed by local modeling with 4 or 5 km grid squares.

Third, the OTAG modelers also deliberated on the appropriateness of a 12 km grid for their purpose (an assessment of regional controls over the eastern U.S.). In doing so they reviewed a number of different modeling studies on the effects of grid resolution on modeling results. The OTAG Final Report summarized the results of these deliberations as follows:

- "Peak ozone concentrations are greater with the fine grid."
- "Spatial concentration patterns are comparable between the fine and the coarse grid, although the fine grid better resolves concentration gradients."
- "VOC reductions produce significant local ozone decreases with either the fine or the coarse grid, although the magnitude and spatial extent of the decreases are greater with the fine grid."
- "NO<sub>x</sub> reductions produce ozone decreases with either the fine or the coarse grid, although elevated source reductions are more effective with a finer grid, and low-level source reductions are more effective with a coarser grid."
- "NO<sub>x</sub> emissions reductions can also produce local ozone increases with the fine or the coarse grid, although the magnitude and spatial extent of the increases are greater with the fine grid."
- "Spatial concentration patterns are comparable between the fine and the coarse grid."

Based upon these independent modeling results, it is concluded that, if anything, the relatively coarse resolution of the Tier 2/Gasoline Sulfur modeling may result in an underestimate of the need for additional emissions reductions. Furthermore, the similarities in the modeling submitted by GM adds confidence that the EPA modeling is accurately predicting the impacts of the Tier 2/ Gasoline Sulfur program. Finally, it should be noted that for the New York, Philadelphia, Baltimore, Atlanta, Houston, Dallas, Beaumont-Port Arthur, and Los Angeles areas, local modeling meeting the very specifications recommended by GM also indicates a need for further emission reductions.

#### Biogenic VOC

The reports which GM advanced as evidence that the OTAG modeling overestimated isoprene considered data from 33 monitoring sites. The majority of these sites were located in the Northeast Corridor. EPA's review of the reports submitted by the commenter indicates that the results are not conclusive for the following reasons:

- 1) The limited data referred to in the AAMA report does not universally point to an



overestimation of isoprene. In fact, at 42 percent of the monitors (14 of 33) the OTAG UAM-V/BEIS-2 model is actually **underestimating** isoprene. The median value of the bias at the monitors used in this study is a 38 percent over prediction which is actually quite good for one of the precursor species.

2) Furthermore, the analysis completed for AAMA calculates model bias and error for sites with as few as three hourly pairs. For many locations, this allows for the statistics to be unduly influenced by a single day's performance. For example, a more statistically robust comparison consisting of a minimum 20 model versus observed pairs yields 16 sites. Across these 16 sites, the model is evenly split between over- and underestimating ambient isoprene levels. Most of the supposed over prediction is being driven by four sites: Providence RI, two near Baltimore MD, and Cape Elizabeth ME.

3) It is not a simple matter to compare observed isoprene concentrations to model volume predictions. Aside from the differences in spatial representativeness between the two values, there are issues involving the temporal compatibility of the residual pairs due to the high reactivity of isoprene. A more appropriate means to evaluate the BEIS-2 emissions is to directly compare ambient isoprene values from specific vegetation types (collected in field studies) to the emissions model predictions. This approach removes possibly confounding influences in the air quality model such as the chemical mechanism, meteorology, the anthropogenic inventory, etc.

4) The OTAG modeling concluded that use of the BEIS-2 model to estimate biogenic emissions was preferred over the previous alternative approach (BEIS) which gives lower estimates of isoprene emissions. The rationale for this decision was described in the OTAG Final Report. "Several factors were considered when selecting the biogenic inventory, including (1) base case model simulations with BEIS and BEIS2, along with a limited model performance evaluation; (2) emissions sensitivity simulations with BEIS and BEIS2; and (3) analysis of ambient isoprene concentrations. The modeling data were generally supportive of BEIS2, while the ambient data analysis was inconclusive (LADCO/Pechan, 1996. "OTAG, Emissions Inventory Development Report, Volume II, Version 1.0: Base Year Modeling Inventory Development," Lake Michigan Air Directors Consortium, Des Plaines, IL, and E.H. Pechan & Associates, Durham, NC.). Also, the general consensus of several researchers supported the use of BEIS2." Isoprene estimates from BEIS-2 are factors of 2-5 times higher than that of BEIS.

According to the ENVIRON report (ENVIRON, 1997. "Comparison of OTAG UAM-V/BEIS 2 Modeling Results with Ambient Isoprene and Other Related Species Concentrations," Novato CA.) "OTAG formed an Ad Hoc Biogenic Emissions Committee to investigate the use of BEIS1 versus BEIS2. It was recommended that BEIS2 should be used and that the CBM-IV isoprene chemistry be updated using more recent smog chamber experiment data which would lower the ozone formation potential of isoprene." The final Tier 2/Gasoline Sulfur modeling also used the updated isoprene chemistry version of CB-IV.

The OTAG Final Report concluded that the model response to reductions in VOC and NO<sub>x</sub> emissions are comparable with either BEIS or BEIS2; however, ozone improvement due to VOC reductions is somewhat greater with BEIS, while ozone improvement due to NO<sub>x</sub> reductions is somewhat greater with BEIS2. Either way, the sensitivity modeling done by OTAG indicated that NO<sub>x</sub> control was still effective in reducing ozone in most areas even with the lower BEIS-derived emissions (OTAG, 1997. "OTAG Technical Support Document, Chapter 2: Regional Scale Modeling Workgroup," Des Plaines, IL.).

#### Weekday/Weekend Comparisons and Ozone Disbenefit Issues

These are addressed in the response to Issue 27.1 (H).

### Observation-based models

As part of their contention that EPA should consider VOC control as opposed to NO<sub>x</sub> control, GM also presented the results from an application of the Smog Production algorithm (Blanchard, C.L., 1998. "Final Report, Coordinated Research Council Project A-17, Analysis of Data from 1995 NARSTO-Northeast Air Quality Study, Volume IV: Observation-driven Methods for Delineating VOC and NO<sub>x</sub> Limitation," ENVAIR, Albany CA.) to the NARSTO 1995 data set and concluded that the ambient data shows more VOC-limited areas than detected by the Tier 2 air quality modeling. It should be noted that the Blanchard (1998) report caveats the results of the analysis with the following statement. "At present, the levels of accuracy of observation-driven methods have not been established, nor has their ability to sharply separate VOC-limited from NO<sub>x</sub>-limited regions been demonstrated."

Many sites reported in this analysis had only one or two hours of data with ozone above the NAAQS. The robustness of the analysis can be expected to be greater for sites at which there were more than a few hours of high ozone available to be used in the calculation of average extent of reaction. When only the persistently high ozone sites are considered, the observational modeling appears to confirm the photochemical grid modeling in terms of NO<sub>x</sub> limitation. As highlighted by the Blanchard report, for those sites (13) with at least five hours greater than 124 ppb, 10 showed median extent values of 1.0 (i.e., NO<sub>x</sub>-limited), two were labeled transitional, and only one was VOC limited. This depiction of NO<sub>x</sub>-limitation is consistent with the results of the Tier 2 air quality modeling.

**COMMENT B.2 - .3:** According to two commenters, the Tier 2 proposal will not ease the task of cities finding additional reductions from other sources, as claimed by EPA, if there are substantial NO<sub>x</sub> disbenefits. Instead, the rule could require certain areas to implement additional VOC reductions to avoid further increases in ozone levels. Other commenters suggest that EPA may not be in compliance with the requirements of Section 202(i)(2)(A) and Section 202(i)(3)(A) of the CAA, which requires EPA to show that reduction in vehicle emissions are necessary in order to attain NAAQS. In the case of NO<sub>x</sub>, reducing emissions may not necessarily lower ozone levels. EPA's air quality analysis of the rule shows that several urban areas will experience higher ozone levels in 2010 (i.e. NO<sub>x</sub> disbenefits). Exhibit A-21 of the analysis (Chapter VII of the RIA), displays the projected increases in ozone levels in 2010 and is not explained in the rule, the RIA, or the analysis itself. EPA should provide further clarification of the NO<sub>x</sub> disbenefits issue before the rule is finalized and should estimate how many areas will experience NO<sub>x</sub> disbenefits and fall out of compliance with the NAAQS for ozone due to the negative environmental impacts of the rule. In addition, EPA may not be in compliance with Section 211(c)(2)(A) of the CAA, which requires consideration of the latest scientific evidence. EPA did not adequately address the scientific analysis it commissioned by Abt Associates as well as the latest science concerning NO<sub>x</sub> reduction strategies for reducing ozone. EPA has not considered the "weekday-weekend" effect studies, which suggest that reducing NO<sub>x</sub> from mobile sources in certain areas will lead to increases in ozone. Congressman McIntosh provides a copy of the following as supporting documentation: Rethinking the Ozone Problem in Urban and Regional Air Pollution, NRC, dated 1991. **(GM, V1:24) (Alliance of Automobile Manufacturers (IV-D-115), p. 28, General Motors Corporation (IV-D-209), vol. 1, p. 24), McIntosh, D. (IV-D-252), p. 2, 4, 7, McIntosh, D. (IV-D-257), p. 1-2, Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Inhofe Questions, p. 1)**

**RESPONSE:** EPA's final modeling predicts some grid cells will experience ozone increases from the emission reductions from the Tier 2 program, but only a few cities are affected and in these cases the ozone increases mostly occur on lower ozone days. In those few cities with an increase in predicted exceedances, the peak ozone level across all episode days drops with Tier 2. Moreover, no area falls out of compliance due to Tier 2 emission

reductions.

EPA notes that the rollback approach to determining future nonattainment favored by the commenters does not indicate an overall attainment disbenefit in any area, i.e., the rollback-based 1-hour design value for 2007 is lower in every case with the Tier 2 reductions.

We have not relied in the final rule on the analysis (by Abt Associates) in the proposal, which the commenters cite as showing ozone increases, because we have determined it was incorrect and have since corrected it. Upon further examination of our methods in light of the comment regarding Exhibit A-21 of the analysis (Chapter VII of the draft RIA), we have realized that the treatment of ozone reductions and increases in the draft benefits analysis was too simplistic. The method used to extrapolate estimated ozone concentrations at monitor locations to areas without ozone monitors had the effect of causing modeled ozone disbenefits at locations with monitors to be carried over to unmonitored suburban and rural areas where the ozone model was actually predicting decreases. For the final RIA, we have reviewed this approach and modified the benefits methodology to make better use of modeling data in rural areas to limit the inference of urban area air quality data to rural areas. In the final benefits analysis ozone increases and associated increases in health symptoms are taken to occur only where the ozone model predicts them to occur. This is generally only in the urban core of certain metropolitan areas. In addition, the final RIA bases its estimates of ozone increases for benefits quantification on the same, revised modeling system used to estimate residual nonattainment without Tier 2. The benefits analysis in the draft RIA, and the estimates and maps of ozone increases reported in association with the economic analysis, used (as a matter of convenience and scheduling) an older and inconsistent modeling system borrowed from the section 812 process.

The technical support document for the final ozone modeling reports fully on the specific metropolitan areas that experience ozone increases as a result of the Tier 2 reductions.

NO<sub>x</sub> disbenefit issues are addressed more completely in our response to Issue 27.1 (H). In general, our modeling indicates that as a result of the Tier 2/Gasoline Sulfur standards, virtually all of the United States will experience reductions in average ozone levels, both in general and on days with ozone exceedances.

**COMMENT C:** According to two commenters, there are major flaws in EPA's projections of future ozone levels and ozone nonattainment areas, which were used to establish the need for mobile source reductions. Aside from the inaccuracies associated with use of the OTAG/NO<sub>x</sub> SIP call modeling [see Issue 27.4, Comment B.1], the mismatch between EPA's historical emissions projections and the real progress made [see Issue 27.4, Comment A.1], and the use of different models to determine need vs. benefits [see Issue 27.4, Comment G], there are additional problems with EPA's underlying analysis used to support the projections related to the number of ozone nonattainment areas. EPA used MOBILE5 to estimate the impact of mobile emissions on future ozone levels, which has many known flaws that make it unsuitable in determining the need for the Tier 2 standards [see Issue 27.4, Comment G.1]. In addition, the assumptions EPA made concerning the emissions from non-vehicle sources may be flawed (i.e. is it reasonable to assume that EPA and the States will issue no more air pollution control rules for the next several decades?). In light of these issues, it appears that EPA's projections overestimate the anticipated ozone concentrations because they do not include all the local controls and do not account for all the reductions that will occur due to the current motor vehicle control program. AAM and GM provide significant discussion on the data and conclusions in the RIA and the accuracy of the ozone projections in light of expected design values for ozone

in many urban areas. The rule will lead to only very minor improvements in areas that are expected to experience ozone exceedances and the commenters reiterate their concern that NO<sub>x</sub> disbenefits may occur primarily in 1-hour nonattainment areas. AAM and GM also provide significant discussion on the use of the MOBILE5 Model to determine the need for Tier 2 standards - and AAM provides a comparison between MOBILE5, the EPA Tier 2 model and the Tier 2 model created by AIR, Inc. **(Alliance of Automobile Manufacturers (IV-D-115), p. 29-37, General Motors Corporation (IV-D-209), vol. 2, p. 32-53)**

A proper analysis of the benefits of further reductions of motor vehicle emissions compared to Tier 1 standards must be conducted. EPA should conduct and publish results of a comprehensive air quality impact analysis as well as an analysis of alternative programs prior to publication of a final Tier 2 regulation. **(DaimlerChrysler (IV-D-59), p. 2)**

**RESPONSE:** Our analysis establishes that there is an air quality need for the Tier 2 program. Our analysis accounts for all current and proposed federal emission control programs on all sources as well as the emission reductions required of the States as a result of the NO<sub>x</sub> SIP Call; this analysis may assume larger emission reductions than would actually occur since it also assumes continuation of the National Low Emission Vehicle program beyond its expiration. This analysis demonstrates that even after accounting for these emission reductions, additional reductions will be necessary to enable areas to attain and maintain the 1-hour ozone standard. We have also shown that reductions in emissions from cars and light trucks are technologically feasible and cost-effective, compared to alternative control strategies.

The commenters use the AIR Tier 2 inventory model as the basis for their own emission inventory projections, which they use in their own ozone analysis. We have evaluated both the inventory model and the ozone analyses used by the commenters. We have several concerns with the AIR Tier 2 inventory model, which are discussed under issue 27.4 (M)(1). Given these concerns and the results of our own air quality modeling, we disagree with the commenters' claims that the rule will lead to "minor" ozone reductions in areas where ozone levels are of concern. Our analyses of the effects of the Tier 2/Gasoline Sulfur rule on ozone levels demonstrates that the rule will result in substantial reductions in ozone levels in areas expected to experience exceedances of the 1-hour ozone standard.

#### Use of MOBILE5

In the final round of ozone and PM modeling, we applied adjustments to MOBILE5 to account for the estimation issues raised by the commenters. These adjustments do a capture the benefit of the federal motor vehicle control program under the NLEV standards.

We have revised and substantially improved the emissions inventory projections, air quality modeling, and cost-benefit analyses from the analyses conducted for our proposed rule, as we committed to do. We have used the same emissions inventory for our inventory trends, air quality, and benefit/cost analyses. This emissions inventory is based on projections which incorporate all of the improvements to MOBILE5 listed by the commenters, using components proposed for incorporation in MOBILE6. Furthermore, because the final rule ozone estimates for 2007 and 2030 were based on direct estimates of the ozone precursor emissions inventories, the commenter's concerns regarding the "percent reduction" between 1996 and 2007 becomes moot.

Emissions modeling issues are addressed more fully under other comment summaries.

#### Non-Vehicle Emission Sources and Local Controls

The commenters question EPA's estimates of future emissions from non-vehicle sources

by raising the possibility that emissions from these sources will be reduced due to unspecified EPA and State controls. We believe this objection is irrelevant to the issue at hand for two reasons. First, we believe it would be improper for EPA and the States to model future ozone levels based on unspecified and unquantifiable emission reductions from other sources to reach attainment. Second, this approach would raise an insurmountable burden of proof for any emission reduction program, since one could always posit that unspecified reductions in "other sources" or from "other programs" would suffice to resolve the air quality problem at issue.

Moreover, commenter's approach would be contrary to the initial criterion of section 202(i), which requires EPA to review the need for emission reductions in general to meet and maintain the NAAQS. EPA must then determine, if there is such a need, whether reductions from LDVs and LDT1s are needed and cost-effective considering other alternatives. This clearly contemplates that alternative approaches to reducing emissions, other than those approaches already required, should not be part of the baseline emission scenario to determine the need for additional reductions.

The EPA emissions and ozone modeling accounted for all the non-vehicle control measures which are properly included as previous emission reductions under CAA section 202(i). While many states will adopt additional controls in the future, this prospect does not affect EPA's determination under section 202(i) that further reductions in emissions are necessary in order to attain and maintain. The possibility of further control of other sources is properly addressed as part of the comparative cost-effectiveness analysis, presented in the preamble and the final RIA.

The CAA requires a finding that emission reductions from light-duty vehicles and light-duty trucks are cost effective taking into consideration alternative means of attaining and maintaining the NAAQS. This implies a decision process involving potential emission controls that have not yet been adopted and that therefore could be alternatives to the additional emission reductions that could be achieved by vehicle standards. This means that we should consider the baseline to properly include only those alternative means that have been adopted. Alternative measures that are still under consideration by the states or EPA, or that are not even being actively considered, should be excluded from the baseline. Therefore, we believe that the assumed baseline program should contain all emission control measures that are presently in place as a result of federal or state actions, as well as all specific measures that have been adopted in a form making them legally enforceable on the source of emissions even if the obligation to comply does not begin until some future time. It should also include emission controls which the CAA directs EPA to adopt as rules, such as mobile source emission standards, where the timing and stringency of those controls is prescribed by the CAA itself, even if the rules have not yet been adopted. Also, where the CAA itself or an EPA rule requires states to adopt specific control measures, to achieve specific emission reductions, or to limit emissions to a specific level, those measure or reductions should also be part of the baseline. This would encompass the new source review program, reasonably available control technology, vehicle emission inspection and maintenance, 12 and 9 percent VOC rate of progress reductions and other provisions of Subpart 2 of part D of Title I of the CAA. The baseline should properly include the Regional Ozone Transport Rule promulgated by EPA on October 27, 1998 (63 FR 57356) and the EPA rules for specific emission sources promulgated under section 126.<sup>34</sup> The baseline should properly include Maximum Achievable Control Technology (MACT) standards for hazardous air pollutants under section 112 where they have been

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<sup>34</sup> At present, the Regional Ozone Transport Rule has been stayed by a panel of the Court of Appeals for the DC Circuit. Since this stay does not invalidate the rule, we are retaining the rule in our baseline for considering the need for additional reductions.

adopted by EPA or a state. We believe that the baseline should not include those MACT standards that merely are scheduled for action since the stringency of such standards is not yet defined. Similarly, the baseline should not include any further control measures which states could adopt at a future time in order to meet the overarching requirement to attain and maintain the ozone NAAQS, even if the state has made an enforceable commitment to achieve additional tonnage reductions in order to attain, and even if it has identified certain measures as ones which it intends to adopt at a future time. Only if the state has made an enforceable commitment for a specific control measure (including the subject sources and either the stringency of control or the specific control technology) should it be considered part of the baseline. The baseline should not include measures that have merely been announced to be the intention of a state. In the EPA modeling, we have used these principles to create the 2007 emissions inventories for the modeling that indicates which areas have exceedances in 2007, to the extent this is possible in a national analysis.

A special note is required regarding the National Low Emission Vehicle (NLEV) program, which by its terms applies only through model year 2003 absent a Tier 2 program of at least comparable stringency. (40 CFR 86.1707-99(e)) EPA has performed its emissions and ozone modeling with an assumption that standards of equal stringency to the NLEV program are applicable in the baseline case even beyond 2003. All commenters appear to support this approach. However, because of the self-expiring feature of the NLEV program, in a strict sense the baseline should not include NLEV standards beyond 2003; our predictions of the need for additional reductions would be even more serious if we had performed the modeling without those standards in the baseline. As the preamble explains, in the case of Washington D.C., the issue of NLEV standards beyond 2003 played a role in including that area on our list of areas certain or highly likely to require further emission reductions in order to attain and maintain.

#### Accuracy of Ozone Projections

Commenters assert that the ozone predictions from the EPA modeling system are inaccurate, and overstate the degree of nonattainment that will exist in the future. These comments were directed at the modeling system used for the proposal, but we have examined this issue with respect to the final modeling system, which incorporates several important improvements as described in Chapter III of the final RIA.

The primary way to examine model accuracy is to compare model predictions for a historical year with actual monitoring data for that year. Such a comparison is suggestive but not decisive, since monitoring data exists only for some locations. The model may in some cases appear to overestimate ozone concentrations because there is no monitor in the location of the actual ozone peak.

The GM comments conclude that the "modeling system" is biased by comparing 1995 base year model predictions against 1995-1997 design values. Because the maximum model predictions are greater than the design values in 12 of the 16 areas listed as residual nonattainment in the NPRM, GM contends that the model "clearly over predicts the severity of the projected nonattainment situation in 2007." However, this type of comparison is misleading due to the differences between the way design values are calculated (i.e., the fourth highest daily maxima at a site over three consecutive years) and an individual grid cell model prediction. The representativeness of the modeling episode days are discussed in 27.4 (E). A more extensive assessment of model performance (i.e., a comparison against observed data paired in space and time) is discussed below.

An operational model performance evaluation was completed for the three 1995 eastern U.S. base cases and the two July 1996 western U.S. base cases. This evaluation

compared model predictions of surface ozone against observed data for each grid cell hour for which there was a monitored ozone value greater than 60 ppb. (There are insufficient ozone precursors or aloft ozone measurements to permit an assessment of model performance for these types of data.) For the eastern U.S. modeling, model performance statistics were calculated for the following areas: the entire model domain, each of four broad regions (Northeast, Midwest, Southeast, and Southwest), 17 subregions, and 36 local areas. For the western U.S. modeling, statistics were calculated for the entire 36 km grid, the 12 km grid, and 10 subregions. No adjustment was made to account for the inherent differences between a grid volume average (12km by 12km by 50m) and a point measurement.

From a regional perspective, model performance over the eastern U.S. for the four 1995 episodes was satisfactory in that, a) regional bias and error values were generally less than what were calculated in OTAG, and b) regional bias and error values were generally within the bounds prescribed in the EPA 1-Hour ozone modeling guidance<sup>35</sup>. The Tier 2 Air Quality Technical Support Document contains more detail on base case model performance.

From a local perspective, model performance over the eastern U.S. for the three 1995 episodes varied from area to area, as expected. Overall, the model tends to underestimate observed ozone, but in some areas base year peaks are over predicted.

The list of 26 areas in Table III.B-1 of the preamble contains those areas that we consider certain or highly likely to require additional emission reductions in order to attain and maintain the 1-hour ozone NAAQS. To form this list, we included areas projected to exceed the NAAQS in 2007 (via the exceedance method), except for areas for which local modeling in SIP submissions indicate attainment without the Tier 2/Gasoline Sulfur program and except for areas in which the model predicted nonattainment in the 1995/1996 period in contradiction to monitoring data showing compliance over the 1995 to 1998 period. The exception for areas with monitoring data showing NAAQS compliance in 1995 to 1998 caused fourteen areas with model predictions of exceedances in 2007 to not be included among the 26. These areas are a sufficient basis for the determination of an overall need for additional reductions, as discussed in section III.B.2.d of the preamble. Several of the fourteen areas were within 10 percent of violating the NAAQS in 1995 to 1998, and are included in Table III.B-2 of the preamble, as areas with moderate to significant risk of requiring additional reductions in order to attain and maintain.

To further respond to this comment, EPA completed an alternative analysis which excluded any area/day for which the base year peak model ozone was overestimated by 20 percent<sup>36</sup> from consideration by the exceedance method. Of the 26 areas characterized in the preamble as certain or highly likely to require additional controls to attain and/or maintain the NAAQS, eight would not appear on the list if model performance was considered via this approach: Charlotte, Cincinnati, Huntington-Ashland, Indianapolis, Louisville, Nashville, Richmond, and Pittsburgh. However, if one also adjusted for excessive model under prediction on other days, Cincinnati and Richmond would once again make the list of residual nonattainment areas. In terms of the list of 12 areas which the preamble

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<sup>35</sup> These criteria were developed based on historical urban-scale attainment demonstrations. It is unclear how appropriate or meaningful they are in the context of regional modeling applications.

<sup>36</sup> Generally speaking, there are no specific rejection criteria in terms of regional model performance. EPA's 1-Hour attainment demonstration guidance suggests an upper bound of 20 percent for allowable bias in peak prediction.

characterizes as having significant to moderate need for additional reductions to attain and maintain the NAAQS (Table III.B-2 of the preamble), five ( Biloxi-Gulfport-Pascagoula MS, Cleveland-Akron OH, New Orleans LA, Pensacola FL, and Tampa-St. Petersburg-Clearwater FL) would be dropped from consideration due to over predictions. All of the other areas listed in Table III.B-1 or III.B-2 of the preamble have at least one day with base year model performance within 20 percent and a 2007 baseline exceedance. The population of the remaining residual nonattainment areas, even accounting for model over predictions, is sufficient to demonstrate the need for the Tier 2/Gasoline Sulfur rule.

#### Ozone Increases

Ozone increases are addressed in the response to Issue 27.1.H.

**COMMENT D:** The manner in which EPA uses the rollback model in the NPRM is flawed, which leads to overestimation of the number of predicted non-attainment areas for 2007. EPA's use of overly coarse grid spacing and unrealistic assumptions regarding in-use emissions from vehicles and Tier 2 light-duty truck, as well as their failure to account for the effect of future sulfur controls on vehicle emissions, the SFTP control of off-cycle emissions, and the impact of OBD-based vehicle repair have all contributed to an overestimation of future ozone levels and ozone non-attainment areas. When these flaws are corrected, only four areas outside California would be in non-attainment in 2007: New Haven, CT; LaPorte, IN; Iberville, LA; and Houston, TX. With the exception of Iberville, all of these locations are areas that are likely to be VOC-limited and as a result the Tier 2 rule may not provide any air quality benefits (and may in some cases lead to higher ozone levels). GM provides significant discussion regarding the inaccuracies of the Rollback Method and notes that EPA's Tier2/Sulfur RIA "Rollback Method" deviates from the procedures in EPA's draft guidance (i.e. Draft Guidance on the Use of Models and Other Analysis in Attainment Demonstrations for the 8-hour Ozone NAAQS, EPA, 1999), which delineates the procedures for using a Rollback Method for scaling an ozone Design Value using modeling results for an attainment test. GM also compared the Rollback Method as applied in the Tier 2 rule to additional modeling work conducted by ENVIRON. GM also provides significant discussion regarding the nature of ozone formation, potential NO<sub>x</sub> disbenefits, and the appropriateness of pursuing a NO<sub>x</sub>-focused rule to reduce ozone levels. GM asserts that EPA should conduct a comprehensive assessment of the potential disbenefits associated with the proposed rule and should allow the public to provide comment on the assessment. **(General Motors Corporation (IV-D-209), vol. 1, p. 20-25; vol. 2, p. 11-16, 32-53)**

#### **RESPONSE:** Emissions Modeling

The inventory modeling which formed the basis of the air quality and cost-benefit analyses presented in this rule incorporates all of the improvements to MOBILE5 listed by the commenters, using components proposed for incorporation in MOBILE6. Specific discussions with regard to in-use LDV and LDT emissions are presented under Issues 27.4 (H), (K), and (L).

#### Specific Approach Used in Rollback Method

As explained in more detail in the preamble and in the response on Issue 27.4(E), EPA does not agree that rollback should be the single, or even primary, method used to predict future nonattainment or attainment of the 1-hour ozone standard. However, EPA now largely agrees with the commenter regarding the detailed approach to determining the "relative reduction factor" for use in rollback, to the extent the rollback approach is to be considered at all.

For the modeling supporting the final rulemaking, the rollback procedure was not used to determine residual nonattainment areas. For reasons discussed in Issue 27.4(F), the exceedance method was used for that purpose. However, in response to this comment, a



rollback-based list of 1-hour projected exceedance areas was prepared based on the final set of modeling. The rollback approach followed procedures similar to those outlined in EPA's 8-hour attainment demonstration guidance, as suggested by GM.

There were two differences in the rollback methodology employed here versus that recommended in the 8-hour modeling guidance. First, a base case cutoff of 80 ppb, instead of 70 ppb, was used to screen out low concentrations. There is a concern when employing the rollback approach that low base year values may not yield representative reduction factors, which would skew the average relative reduction factor. The relationship between relative reduction factors (RRF) and base year concentrations was investigated for several available strategy simulations. An analysis showing that reduction factors for one-hour ozone were generally independent of base year concentrations when the base values were greater than 80 ppb is in the docket.

Second, instead of calculating RRF for each individual monitor in a county and multiplying the result by each monitor's design value, this analysis only considered the monitor site with the highest design value in the county. It is expected that this simplification can only underestimate future-year design values.

#### Grid Size

This issue is addressed in the response to Issue 27.4.B.1.

#### Residual Nonattainment in 2007

The short list of residual nonattainment areas put forth by the commenters was developed with the rollback method used in isolation, a practice which EPA also does not support. The rollback issue is discussed in more detail in the response to issue summary 27.4 (E).

Also, the shortness of this list is due in part to the emission estimates used in the automobile industry's ozone modeling. We have reviewed the emissions estimates used in the industry studies. We concluded that the industry's emissions estimates employ inappropriate analytical steps in the calculation. Among the problems are that the adjustments for the benefits of inspection and maintenance programs were not consistent with the base estimate of in-use emissions, and the sales trend towards light trucks and SUVs was not properly captured. Also, as stated, we disagree with the use of the rollback approach as the sole test of attainment. As a consequence, we conclude that the industry's ozone modeling is not an appropriate basis for making predictions of future attainment or nonattainment. The treatment of these issues is more appropriately addressed as we have in our final round of ozone modeling.<sup>37</sup> Our point-by-point review is given in Chapter III, Section A of the final RIA and in other portions of this Response to Comments document. Specific discussions with regard to in-use LDV and LDT emissions are presented under Issues 27.4 (H),(K) and (L).

Our response to Issue 27.4 (E) includes a hypothetical rollback analysis using our ozone modeling results. We calculated in this analysis that, if we did consider rollback to be an acceptable single test for future nonattainment, 15 metropolitan areas and three other counties, with almost 56 million in population in 1996, would be predicted to violate the NAAQS in 2007.

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<sup>37</sup> As explained in the final RIA, our very latest estimates of car and light trucks without the benefits of our new standards are actually somewhat higher than the estimates used in the final round of ozone modeling, because more recent data indicate even more serious adverse emissions effects from sulfur in gasoline. Thus, we think our predictions of ozone nonattainment may be conservative.

Moreover, these 15 areas are geographically spread out.<sup>38</sup> We believe that this result using the rollback method does not fully capture the likely nonattainment that would exist in 2007 in the absence of additional emission reductions. However, even if we were to consider the use of rollback valid, we consider this set of areas to also be an adequate basis for making the same determinations we have made based on the more appropriate exceedance-based analysis.

#### Consideration of NOX Increases

EPA notes that in the October 1998 submission from the AAM, color maps were provided based on EPA's first round of ozone modeling showing grid cells where NOX increases were observed. These maps fail to distinguish the more numerous cases of ozone increases that did not cause an exceedance from the far fewer cases in which an ozone increase caused or increased the level of an exceedance. EPA's metrics as described in the technical support document for the ozone modeling do properly distinguish these two cases.

NOX disbenefit issues are further addressed in the response to Issue 27.1.H.

**COMMENT E:** EPA's additional analysis in the SNPRM (i.e. the exceedance method) overestimates the number of areas that are projected to be in nonattainment and introduces a major bias that results in an overprediction of future ozone levels. AAM and GM provide significant discussion regarding the exceedance method and why this method leads to an overprediction of areas that will experience problems with ozone nonattainment. Because the 1-hour standard allows up to three exceedances in a three year period, areas that may experience an exceedance are not necessarily in nonattainment. EPA's exceedance method in the SNPRM simply captures those areas that are "projected to experience exceedances of the 1-hour standard in 2007 without Tier2/Sulfur controls." Based on these areas, EPA concludes that there are more areas that need further ozone precursor emission reductions to meet the 1-hour ozone NAAQS than previously predicted. This conclusion may not be accurate since many areas experience exceedances but continue to achieve the 1-hour standard. In using the exceedance method, EPA omits the step necessary to adjust the projections of future ozone (i.e. calibrating the 1995/1996 ozone predictions of the model to 1995-1997 actual ambient observations). By not taking this into account, the exceedance method propagates all cases of overprediction into the future. EPA's criteria for whether to include certain areas in their analysis also leads to overprediction. [For this point, AAM cites to Harvey Michaels 6/22/99 memo to the Docket "Exceedance Method of Analysis of Photochemical Modeling in Support of Tier 2/Sulfur."] EPA also increases the extent of the 1-hour problems in 2007 by including the LA Basin with its 13 million people. However, the impact of Tier 2 will be only 4 tons of NO<sub>x</sub> per day in the South Coast and in addition, this area is likely to be VOC-limited which will lead to NO<sub>x</sub> disbenefits. AAM also cites to: U.S. EPA, "Guidance on use of modeled results to demonstrate attainment of the ozone NAAQS," EPA-454/B-95-007, June 1996, and notes that EPA's use of the exceedance method in the SNPRM is inconsistent with this guidance. **(Alliance of Automobile Manufacturers (IV-D-115), p. 31-33, General Motors Corporation (IV-D-209), vol. 1, p. 19-20; vol. 2, p. 4-9)**

**RESPONSE:** There are two issues regarding ozone nonattainment prediction embedded in

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<sup>38</sup> We did not include the Los Angeles-Riverside-San Bernardino area in this analysis, since it was not covered by our 2007 modeling, but we do believe it is rightly part of the basis for a determination on the need for additional reductions. Adding the population of this area would bring the total population to nearly 72 million.

this comment: 1) model prediction bias can lead to overestimated residual nonattainment, and 2) the relationship between the form of the NAAQS and the exceedance method. Commenters advocate the use of the rollback method based on their assertion that it avoids these problems.

To summarize our response; (1) EPA has evaluated the modeling for bias, and we have found that its performance is generally satisfactory and biased low by 5 to 10 percent. Even if the few areas where there are indications of overprediction in the base monitoring period are excluded, EPA's determination of the need for additional emission reductions would not change. (2) For a number of reasons, we consider the rollback approach recommended by commenters to be inappropriate if used in isolation as they have recommended. However, even if we were to have used this rollback approach, our modeling would have predicted enough areas in residual nonattainment in 2007 to support the determination we have made that further reductions in emissions are necessary in order to attain and maintain the 1-hour ozone NAAQS. Therefore, even if we were to take a different approach to both these issues, it would not have affected our conclusions and determinations.

#### Model Prediction Bias

As discussed in the response to Comment 27.4.C, above, regional model performance is generally satisfactory and biased low by about 5-10 percent. However, the base year model performance is overestimated on some days in certain areas. Although there are no specific acceptance/rejection criteria relevant to regional model performance, EPA completed an analysis which excluded from consideration by the exceedance method any area/day for which the base year peak model ozone was overestimated by 20 percent. EPA's 1-Hour attainment demonstration guidance suggests an upper bound of 20 percent for allowable bias in peak prediction, but this is not necessarily applicable or meaningful for regional modeling. The conclusions from this analysis are described in the response to Comment 27.4.C, above. While there are indications of over predictions in a limited number of areas, they did not affect enough areas to change the determination that additional reductions are needed.

The comment regarding "propagates all cases of over prediction into the future" is a reference to the issue of model accuracy in predicting ozone concentrations. The commenters provided extensive tables of instances in which the prediction of ozone with 1995 emissions, interpreted by the exceedance method, did not give the same attainment conclusion as the ozone monitoring data from that period. Also, commenters point out that the absolute value of the highest ozone exceedance was higher than the monitor-based design value in more cases than it was lower.

We have made improvements to our emissions estimates, our episodes, and other aspects of the modeling system. These changes have improved the accuracy of the predicted ozone concentrations. Also, our list of 26 areas that support our finding that additional reductions are needed does not include any areas where recent monitoring data shows no violations. In addition, we have considered local ozone modeling and other evidence in SIP submittals, and accordingly have not placed several areas on our list of those certain or highly likely to require further emission reductions, even though our final ozone modeling predicted them to have exceedances in 2007.

As explained in the final RIA, our very latest estimates of emissions from cars and light trucks without the benefits of our new standards are actually somewhat higher than the estimates used in the final round of ozone modeling, because the most recent data indicate even more serious adverse emissions effects from sulfur in gasoline. Thus, we think our predictions of ozone nonattainment using emission estimates prepared before this most

recent data on sulfur was considered, may be conservative.

#### Form of the NAAQS/Episode Selection

The commenters assert that the modeling done to support the NPRM was biased toward an artificially large number of future projected exceedance areas due to episode selection. They also raise the issue of the form of the NAAQS, namely that it allows three exceedances in a three-year period, and only considers the fourth (expected) exceedance to constitute nonattainment. The issue of the three exceedances allowed by the NAAQS in any three year period and the selection of episodes are closely related. In retrospective NAAQS determinations, three full seasons of ozone data, or about 300 days, are examined to determine if there were more than three days with ozone above 124 ppb. In our final ozone modeling, we predicted ozone concentrations for only about 30 days, all within one ozone season. While our exceedance method considers an area to be violating the NAAQS if there is even a single exceedance among the episode days, it also does not challenge each area with all the 300 or so days that would be considered in an actual NAAQS attainment determination. The issue commenters are implicitly raising is whether these two opposing considerations result in an over prediction of nonattainment. This cannot be answered on principles and definitions alone. If our 30 episode days are too mild (i.e., low ozone forming potential), our modeling would be under predicting nonattainment even though our exceedance method considers a single day with an exceedance to be an indicator of future nonattainment. The converse would occur if our 30 episode days are too severe.

It should be noted that in actual fact, most of the 26 areas which we have characterized as certain or highly likely to require further reductions in order to attain and maintain had at least one grid cell with two predicted 2007 exceedances among our episode days in our final modeling, and all of our episode days come from one calendar year. This information for all such areas is given in the Technical Support Document. If all years were alike, which of course is not the case, this would indicate that over three years, most of these areas would all have six or more exceedances at one site, enough to clearly constitute a NAAQS violation. However, the issue of meteorological patterns is more complex, and requires a closer consideration of episode selection. A close examination of our episodes shows that even a single exceedance among our episode days is a sufficient indicator of nonattainment.

One major difference between the NPRM modeling and the modeling completed for the final rulemaking was that several different episodes were simulated. As discussed further below, EPA believes these episodes well represent design value levels of ozone for most areas of the eastern U.S., and accordingly it is appropriate to compare the highest predicted exceedance to the NAAQS, just as a design value is compared to the NAAQS.

There are several considerations involved in selecting ozone episodes for an ozone modeling analysis. In general, the goal should be to model several sets of meteorological conditions leading to ambient ozone levels similar to an area's design value. Ideally, the modeling time periods would be supported by large amounts of ambient data to be used in input development and model evaluation. The obvious problem, in terms of the regional/national Tier 2 modeling, is how to meet these episode selection goals over a large number of individual ozone non-attainment areas without having to model several entire ozone seasons (impossibly time consuming and resource-intensive). It is inevitable that the chosen modeling days will feature observed ozone lower than the design value in some areas and greater than the design value in other areas.

EPA examined how having only 30 specific episode days and not allowing any exceedances might affect over or under prediction of nonattainment. EPA completed an

analysis for all counties in the eastern U.S. whose present design value (DV) is 120 ppb or greater. We examined monitored ozone concentrations on the days with the five highest ozone values recorded in that county during the 30 episode days from 1995 used for the Tier 2/Gasoline Sulfur modeling. There are 110 counties with 1996-1998 design values greater than 120 ppb. The majority of the areas had relatively good matches between their design value and the highest ambient ozone observed within a 1995 episode day. In other words, the ozone forming conditions on our worst episode day in most areas are similar to those on the fourth-worst day from the three year period 1996 to 1998. This indicates that by considering an area to be in nonattainment with the NAAQS whenever any episode day peak in 2007 is higher than 124 ppb, the exceedance method is generally using a test that is comparable to requiring that a three-year design value be 124 ppb or below, consistent with the form of the NAAQS.

The previous discussion considers the severity of a given base year episode day by comparing it to the area's three-year design value. A separate methodology can be used to assess the relative frequency of a given set of meteorological conditions (Cox, W. M. and Chu. S., 1996. "Assessment of Interannual Ozone Variation in Urban areas from a Climatological Perspective," *Atmospheric Environment*, Vol 14, No 14 pp 2615-2625.). Ozone data were analyzed over a 44 year period to determine, via a regression model, the meteorological characteristics that most often lead to elevated amounts of ozone in a particular area. Based on the resultant model, each ozone day within the period can be ranked according to its "meteorological severity".

We completed an alternative analysis using an application of this procedure for 29 major metropolitan areas in the eastern U.S. In the EPA guidance on 1-hour attainment demonstrations, States are allowed to adjust their attainment target on meteorologically infrequent days to values greater than 125 ppb. In an alternative analysis to explore the issue raised by the commenters, the exceedance method used to support the Tier 2/Gasoline Sulfur rulemaking was modified to allow for consideration of these alternative targets. While some area/days were no longer considered to be projected exceedances in the 2007 baseline, no areas were removed from the list. Each residual nonattainment area (for which data was available to complete the analysis) had at least one day in which the 2007 baseline maxima exceeded the attainment target, 125 ppb or otherwise. This is described in more detail in the technical support document.

#### Rollback versus Exceedance Method

In most areas, we predicted 2007 or 2030 attainment or nonattainment based on the exceedance method. The exceedance method predicts an area to be in attainment only if there are no predicted exceedances of the NAAQS during any episode day. However, for the areas for which we have received 1-hour attainment demonstrations in SIP revisions, our predictions were based on a larger and more robust set of data. When a state's modeling shows an exceedance that would otherwise indicate nonattainment, we allow the state to submit a variety of other evidence and analysis, such as locality specific meteorological conditions, analysis of air quality and emissions trends, observational based models that make use of data on concentrations of ozone precursors, a rollback analysis, and information on the responsiveness of the air quality model. We then make a weight-of-evidence determination of attainment or nonattainment based on consideration of all this local evidence. We did this in forming the set of areas we consider certain or very likely to need additional reductions to attain and maintain, in some cases concluding that attainment and maintenance was demonstrated and in others that it was not.

The auto industry commenters recommended the use of rollback as the single method for making attainment and nonattainment predictions from predicted ozone concentrations. They stated that the rollback method would be more consistent than the exceedance

method with the NAAQS's allowance of three exceedances in a three year period. They also believed that the rollback method would compensate for what they considered to be model over predictions of ozone concentrations. We believe that the rollback method is not appropriate for use as a sole, or even primary, test of 1-hour ozone attainment or nonattainment.

Application of a rollback-type test for attainment demonstrations of the 1-hr NAAQS for ozone is not a preferable way of predicting attainment or nonattainment and should only be used with other, more appropriate corroborative analyses. The "rollback" test depends on there being an adequate ozone monitoring network. Adequacy of the network is a function of whether there are likely to be major spatial gradients in ozone concentrations which would be undetected by the monitors. Such gradients are more likely for the 1-hr NAAQS than for the 8-hour NAAQS. This follows due to the shorter averaging time specified in the NAAQS. Thus, application of the rollback test to the 1-hr NAAQS may be less appropriate than would be the case for the 8-hour NAAQS, possibly leading to adoption of a strategy which is inadequate to attain the 1-hr NAAQS. If the rollback test is applied for a 1-hour NAAQS attainment demonstration, it should be done in concert with the exceedance test which as discussed below is a better predictor of attainment or nonattainment for the 1-hour NAAQS, as well as with other analyses performed as part of a weight of evidence determination.

Concern about ability of monitoring networks to adequately capture the spatial distribution of 1-hour peak concentrations is the primary reason for being cautious about using the rollback approach as a primary attainment test for the 1-hour NAAQS. Another reason is related to the form of the 1-hour NAAQS. The form of this NAAQS is such that observed design values can be driven by 4 observations in a single year. As such, the design value (i.e., a key input to the test) can undergo dramatic shifts once a crucial year is no longer included within the 3-year period used for the computations. In contrast, the design value for the 8-hr NAAQS is based on an average value over 3 years and so is likely to be more stable. Abrupt shifts in the design value could lead to changes in the outcome of the rollback test. This is more likely to happen with the 1-hr NAAQS, because the form of this NAAQS results in design values that are likely to be heavily influenced by observations in a single year. The method of using meteorological rankings of episode days to set adjusted ozone targets for days with ozone forming conditions that are expected to occur very rarely, as described above, is a way to test for whether the NAAQS would be met under conditions that represent "average" conditions over a period longer than just the three years used to calculate the most current design value. As stated above, in an alternative analysis using this approach, no areas had all their exceedances eliminated.

There are additional concerns about the rollback test as a primary method when it is applied in a regional modeling analysis as was done in the past. The EPA guidance on the use of rollback in 8-hour attainment demonstrations includes certain steps intended to minimize the possibility that a future nonattainment situation would be overlooked. For example, the test needs to be applied at all sites with design values near to or exceeding the NAAQS, and the highest of monitored design values observed at each site over several 3-year periods should be used. Finally, locations with consistently higher predicted ozone concentrations than those near any of the monitor sites need to be considered using a screening test described in the guidance for the 8-hour NAAQS. In our alternative analysis using rollback (described below) we did not apply these steps, so our resulting list of rollback-based 2007 nonattainment areas may be too short. It is not evident from the industry comments that the commenters applied these steps, so their list might be too short also.

EPA does recognize a role for rollback in state-specific 1-hour attainment demonstrations, but only as part of a broad weight of evidence determination. In determining the attainment

and maintenance prospects of numerous areas, as we have had to do under CAA section 202(i), it is not possible to assemble and consider the full set of local evidence that should accompany any consideration of a rollback analysis. In such a situation, we believe that the exceedance method is the appropriate choice.

We have not completely excluded the rollback approach from the determinations in this rulemaking. We have considered it for those areas for which we had enough information to allow us to consider it in its proper context, i.e., for those areas covered by recent 1-hour SIP submissions. Of these areas, we concluded that some will not attain without additional reductions and some will.

While we disagree with the use of the rollback method as the primary test of attainment, we have conducted a hypothetical analysis of 2007 attainment in all areas based on our own final ozone modeling without any additional local information, applying the rollback method recommended by the commenters. The rollback approach followed the procedures outlined in EPA's 8-hour attainment demonstration guidance, as suggested by GM, except for the two differences noted in the response to Issue 27.4D. (A base case cutoff of 80 ppb, instead of 70 ppb, was used to screen out low concentrations which may not yield representative reduction factors. Also, we examined only the highest monitor in each county.) We applied relative reduction factors to the higher of the 1995-1997 or 1996-1998 design values, and calculated in this analysis that 15 metropolitan areas and three rural counties with almost 56 million in population (1996 data) would violate the NAAQS in 2007: Atlanta, Washington-Baltimore, Baton Rouge, Beaumont-Port Arthur, Chicago-Gary-Kenosha, Dallas-Fort Worth, Grand Rapids-Muskegon-Holland, Hartford, Houma, Houston-Galveston-Brazoria, Longview-Marshall, New London-Norwich, New York-Northern New Jersey-Long Island, Philadelphia-Wilmington-Atlantic City, Sheboygan, and Iberville Parish, LA, La Porte Co., IN, and Manitowac Co, WI.

Moreover, these 15 metro areas and three other counties are geographically spread out.<sup>39</sup> We believe that this result using the rollback method does not fully capture the likely nonattainment that would exist in 2007 in the absence of additional emission reductions. However, even if we were to consider the use of rollback valid, we consider this set of areas to also be an adequate basis for making the same determinations we have made based on the more appropriate exceedance-based analysis.

This rollback analysis is documented in the Technical Support Document for the Tier 2/Gasoline Sulfur ozone modeling.

#### Consideration of Los Angeles/South Coast Air Basin

We have considered the need for additional reductions in California, since we believe that the CAA provision that allows California to adopt and enforce its own vehicle standards does not require us to ignore the impact that vehicles meeting federal standards have on air quality in California. However, we recognize that with respect to vehicle standards the reductions that will contribute to attainment and maintenance in California are those that are actually achieved in California from in-migrating and in-visiting vehicles which would be subject to our standards and not to any more stringent California standards. With respect to gasoline sulfur standards, we can also consider the emissions of California vehicles that travel to other another state and are refueled there before returning to California.

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<sup>39</sup> We did not include the Los Angeles-Riverside-San Bernardino area in this analysis, since it was not covered by our 2007 modeling, but we do believe it is rightly part of the basis for a determination on the need for additional reductions. Adding the population of this area would bring the total population to over 60 million.

While 4 tons/day is a small part of the emission reduction required for the South Coast Air Basin to attain, we believe given the size of the area and the number of people affected, it is correct to include this area in our overall conclusions that additional reductions are needed. There is ample evidence that further reductions in emissions, i.e., beyond the reductions to which the state has legally committed itself, are highly likely to be needed for attainment and maintenance. Indeed, we have not approved the SIP revision from which the 4 ton figure was obtained, and the state and local authorities are preparing another revision.

California and local authorities continue to pursue NO<sub>x</sub> reductions as part of the strategy to achieve the ozone and PM<sub>10</sub> NAAQS together, after much study and scientific scrutiny of all the evidence. They and we do not accept the commenters' statement that NO<sub>x</sub> reductions would be counterproductive in the South Coast Air Basin.

**COMMENT F:** EPA must clarify the distinction between the "exceedance" and "rollback" methods of air quality modeling. A clear explanation of the technical rationale for the shift from actual air quality is absent from the notice and should be provided by EPA. Under no circumstance does it make sense for EPA to turn away from consideration of actual data. The two models produce substantially different results, and EPA has failed to explain these differences. This failure violates the "intelligible principle" requirement set forth in the NAAQS court case. **(American Petroleum Institute (IV-D-114), p. 5, 97, Marathon Ashland Petroleum LLC (IV-D-81), p. 26, 33, Midwest Ozone Group (IV-D-139))**

**RESPONSE:** The first supplemental notice, the final rule preamble, the final RIA, and this Response to Comments document, along with our 1996 guidance on 1-hour ozone attainment demonstrations, provides the rationale requested by the commenters. The exceedance method as used in the final rule does not turn away from consideration of actual data. Rather, we have considered the fullest possible set of ozone modeling results available, by incorporating analyses submitted with 1-hour SIP revisions. EPA has, in these documents, provided a comprehensive explanation of the modeling analysis it has performed, and considerable evidence regarding the benefits of the exceedance method, providing a reasonable and intelligible basis for its use in this rulemaking.

**COMMENT G:** The emission inventory analysis performed to support the need for the Tier 2 standards does not use the same model or emissions analysis that was developed to determine the benefits of the Tier 2 standards. As a result, the separate ozone projection included as part of the cost-benefit analysis in the RIA is inconsistent with the "needs" emission analysis. **(See letters listed under Comments G.1 and G.2 that follow.)**

**RESPONSE:** The commenters provided detailed comment on this issue. Their comments are summarized below.

**COMMENT G.1:** The emission inventory analysis performed to support the need for the Tier 2 standards uses the EPA MOBILE5 model, which has many known flaws that make it unsuitable in determining the need for the Tier 2 standards. The model used to determine the benefits of the Tier 2 standards was the new Tier 2 model. AAM and GM question why EPA would base the inventories for ozone modeling on MOBILE5, instead of the new Tier 2 model. AAM and GM provide significant discussion regarding the problems associated with MOBILE5, which include the following: does not include off-cycle emission or the effects of off-cycle controls; no benefit for onboard diagnostics systems; does not properly reflect the impact of gasoline sulfur on advanced technology; deterioration from Tier 0, Tier 1, and NLEV is too high; and truck VMT fractions are too low. If these factors affect the percent reductions in VOC and NO<sub>x</sub> emissions from the mid-1990s to 2007, then they will



also affect the ozone air quality analysis. The commenters argue that the exhaust VOC and NO<sub>x</sub> reductions using the newer model are greater than with MOBILE5b. Thus, the use of the EPA Tier 2 model or one that more adequately reflects all of the above factors could have a significant effect on the number of areas that are projected to be in nonattainment in the 2007-2010 timeframe. **(Alliance of Automobile Manufacturers (IV-D-115), p. 34-37, General Motors Corporation (IV-D-209), vol. 2, p. 9, 16-17)**

**RESPONSE:** Responses to comments dealing with emissions modeling issues are given under Issues 27.4 (H) through 27.4 (M).

**COMMENT G.2:** The analysis presented in the cost-benefit portion of the RIA acknowledges that urban regions have smaller reductions in ozone due to the proposal than less-populated rural regions. This finding is inconsistent with the emission calculations elsewhere in the RIA (i.e. the "needs" analysis), which purports to demonstrate that the Tier 2 standards are necessary to achieve the NAAQS. The "needs" emission analysis indicated that the proposal has larger emission impacts in urban areas than in rural areas. EPA must reconcile these differences. A more accurate "needs" analysis may show that the NO<sub>x</sub> control strategy will not have a large effect in the urban areas of concern and that many of these areas are VOC-limited. **(General Motors Corporation (IV-D-209), vol. 2, p. 9)**

**RESPONSE:** The commenter is correct that the "needs" section of the proposal's draft RIA was prepared separately from the benefits-costs section. The result in the cost-benefit portion of the RIA regarding urban versus rural ozone reductions was due to a simplified approach to estimating ozone concentrations in areas without ozone monitors, as noted in the response to Issue 27.4.B.2-.3. For the final RIA, we have reviewed this approach and modified the methodology to make better use of modeling data in rural areas to limit the inference of urban area air quality data to rural areas. For the analysis of the final rule, the same ozone modeling used for estimating residual nonattainment is being used to estimate economic benefits. Indeed, the revised benefits analysis shows that ozone improvements are greater in urban areas than in rural areas.

**COMMENT H.1:** In the new Tier 2 model, EPA's estimates of emissions for Tier 1 and NLEV vehicles equipped with onboard diagnostics are far too high. A factor that introduces bias into the new Tier 2 model is EPA's assumptions regarding the effectiveness of on-board diagnostics. OBD systems are very effective at notifying drivers when emissions exceed 1.5 times the standard (as required by regulation) and the response rate is higher than EPA has assumed in almost all cases, and particularly in areas with no I/M programs. The commenters provide specific recommendations and/or comments regarding the effectiveness and response rates that should be assumed. **(Alliance of Automobile Manufacturers (IV-D-115), p. 39-40, General Motors Corporation (IV-D-209), vol. 2, p. 19-20)** **(See letters listed under Comments H.2 and H.3 that follow.)**

**RESPONSE:** The AAM/GM comments on the issue of On-Board Diagnostic (OBD) system effectiveness can be divided into three general categories: 1) how effective OBD systems will be at detecting high-emitting vehicles, 2) the response rate of owners whose vehicles are flagged as malfunctioning by the OBD system and receive repair in areas with and without I/M programs, and 3) the level of emissions after an OBD-based repair. Overall, the commenters contend that our proposed estimates in each category are overly conservative (except for the repair rate in I/M areas). In response to these comments, we have revised our estimates only for the after-repair emission level (issue (c)), and incorporated this change into our updated Tier 2 Model discussed under 27.4.(M)(2). Our

assessment of each issue is discussed below.

We have not changed our estimates for OBD failure detection rate or the rate of owner response to these failures. Sufficient data are not available to empirically estimate the effectiveness of and response to OBD systems in the field over the life of a vehicle; given that the commenters do not provide any new information to support their claims, we do not believe a compelling case has been made to change our initial estimates. With regard to the issue of OBD failure detection rate, the commenters argue that the rate should be increased to 100 percent in accordance with how they are required to perform in-use; using this logic, it could also be argued that our estimates of in-use emission rates should assume that vehicles only comply with the FTP emission standard, since this is the requirement manufacturers are held to in-use. However, in-use emission test programs repeatedly verify that vehicles do exceed their FTP emission standard, particularly beyond the useful life mileage point on which the standards are based. Accordingly, it is reasonable to assume that not all OBD systems will perform as intended by the manufacturer, particularly beyond the mileage level for which they are held liable for its performance.

Two potential limitations of current OBD systems must be taken into account when predicting the real-world performance of these systems. First, current OBD systems are required to identify problems with individual components of the emission control system which can cause a vehicle to exceed its emission standards by a factor of 1.5. It is possible in-use, however, for a combination of minor problems to cause a similar level of emission increase. Current OBD systems will most likely not detect such a situation, as long as any individual problem is minor. Second, catalyst performance monitoring is still limited by available technology. The HC conversion efficiency of a catalyst is usually inferred from the oxygen storage capacity of the catalyst, the assumption being that if a catalyst experiences sufficiently high temperatures to significantly reduce its HC conversion efficiency, the same high temperatures will have significantly reduced its oxygen storage capability. This is supported by lab-based correlations, but may not be as accurate a predictor in-use. Adequacy of the CO and NO<sub>x</sub> conversion efficiencies of the catalyst are not even indirectly measured, but are assumed to be the same as the HC conversion efficiency.

Our estimate of OBD failure detection rate must take into account the average performance of the OBD system under all conditions, over the entire life of a vehicle. Given the uncertainty in how these systems will perform in-use (particularly at higher mileages, where the highest concentration of emission malfunction will occur), and the technical considerations detailed above, our estimate that on average 85 percent of emission failures will be detected by the OBD system is not unreasonable, particularly in the absence of data to the contrary.

The issue of owner response, particularly in non-I/M areas, is at this time strictly a matter of judgment. Our judgment is that in the absence of an I/M program, voluntary response to OBD-detected failures will depend primarily on whether the needed repairs will be paid for under warranty; under limited or no warranty situations, we expect voluntary response to be relatively low. This notion was supported in comments received on our MOBILE6 model by the State of Colorado, who indicated that many new vehicles fail their I/M program because MIL lights are on, pointing to a "general disregard [of] MIL indications".<sup>40</sup> Recommendations made by AAM/GM reflect their own judgment, with no data provided to substantiate their claims. This issue in particular is not greatly relevant to the issue of urban ozone

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<sup>40</sup> "Comments on Draft MOBILE6 Report M6.EXH.007 Received Outside of the Tier 2 Comment Process", Memorandum from John Koupal To Docket A-97-10.

nonattainment; most of the areas included on our list of areas which are certain or highly likely to need further reductions to attain and maintain (see the Preamble, Table III.B-1) are I/M areas, where the non-I/M response rates are less relevant. While automotive emissions outside of the urban area impact urban ozone levels via transport, the primary impact is from local emissions.

On the issue of response in I/M areas, our estimate that 90 percent of failures detected by the OBD system will be repaired is consistent with our estimates of waiver and noncompliance rates for dynamometer-based I/M programs.<sup>41</sup> The commenters are incorrect in contending that we overestimate benefit for I/M programs by assuming that vehicles are repaired immediately. The emission inventory used for the Tier 2 rule are structured to estimate emissions based on a "snapshot" of the fleet once per year, meaning that in essence the distribution between "normal", "high" and "repaired" vehicles is assessed once per year. Implicit within this structure is the assumption that vehicles have up to one year (or six months on average) to become a high emitter and receive repair.

In response to the AAM/GM comments, we have revised our estimates regarding the level to which vehicles will be repaired through response to an OBD system failure. Our proposal estimated that vehicles on average would be repaired to 1.5 times the 50,000 mile standard, where it would remain constant (not deteriorate) for the remainder of its life. This emission level is the maximum allowed before the OBD light should come on. The commenters contended that this is overly conservative, and recommend that the after-repair level be 1.0 times the FTP standard, without deterioration. We believe that emission levels will be lower than our original estimate upon repair, but that these vehicles deteriorate upon repair in a manner consistent with our assumptions for normal emitters. Our revised approach to modeling after-repair emissions is to therefore assume that upon repairs, high emitters are simply "returned" to the normal emitter category. Repaired emitter emissions are capped at 1.5 times the standard, the threshold for OBD failure detection; this occurs at approximately 150,000 miles for NO<sub>x</sub>, and nearly 240,000 miles for HC. This revision serves to increase the benefit of OBD systems relative to our initial proposal, and is reflected in our updated modeling results discussed in Issue 27.4.M.1.

**COMMENT H.2:** EPA also applied a high-emitter adjustment factor to account for the potential effects of recruitment bias on the ARB data sample. This factor was calculated by comparing I/M240 test data to voluntary recruitment test data and was reduced by an arbitrary 25% by EPA "to account for reductions in high emitter emissions expected between Tier 0 and Tier 1 vehicles and to prevent unduly large high emitter fractions." EPA should indicate how it derived this 25% reduction factor and explain what would be an "unduly large high emitter fraction." (Commenter cites to Determination of NO<sub>x</sub> and HC Basic Emission Rates, OBD and I/M Effects for Tier 1 and Later LDVs and LDTs" EPA 420-P-99-009). EPA assumed that high emitters would be reduced by 50% of the standard through the imposition of Tier 2, but does not provide the basis for this assumption. EPA has also failed to analyze available industry data to determine if high emitter emission rates should be reduced by 50% of the standard. **(General Motors Corporation (IV-D-209), vol. 2, p. 20-21)**

**RESPONSE:** The AAM/GM comments on our treatment of high emitters in developing Tier 1 and later NO<sub>x</sub> emission rates based on a sample of vehicles tested by the California Air

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<sup>41</sup> Koupal and Glover, "Determination of NO<sub>x</sub> and HC Basic Emission Rates, OBD, and I/M Effects for Tier 1 and later LDVs and LDTs", Draft Final MOBILE6 Report M6.EXH.007, December 1999.

Resources Board (ARB) focuses on three subissues: 1) our application of an "I/M adjustment" to account for the effects of the California I/M program on the test data; 2) our application of a high-emitter adjustment factor to account for recruitment bias observed in our development of pre-Tier 1 emission rates; and 3) our methodology for developing estimates of high emitter emissions for post-Tier 1 vehicles. In response to comments, we are revising our approaches to the first two issues; we are not revising our approach to issue (3). Each issue is discussed in detail below.

Subissue (1): As discussed under Issue 27.4.K, for our updated Tier 2 Model we have revised our Tier 1 NO<sub>x</sub> emission rates to include a substantial number of vehicles tested by the auto manufacturers, as well as additional vehicles tested by ARB and EPA.<sup>42</sup> We are using these vehicles to first establish emission rates which reflect no IM or OBD, from which emission rates which do reflect OBD and/or IM are developed. The ARB and auto data are comprised mostly of vehicles certified to California's 0.4 g/mi NO<sub>x</sub> standard, in place since the early 1980's; this standard level is the same as the Federal Tier 1 standard. The ARB and domestic auto manufacturer emissions testing laboratories are located in the Los Angeles area; thus, the majority of the California vehicles tested by the ARB and auto industry were presumably from Southern California, where an I/M program has been in place since the early 1980s. We are concerned that the effect of California's I/M program introduces a bias to these results which would result in an underestimation of emissions if these vehicles were assumed to represent non-I/M conditions. In our proposal, we consequently tried to account for this by assessing an "I/M adjustment" using on MOBILE5 results run with and without I/M. This adjustment was in fact very minor, as it was based on MOBILE5 I/M credits for an idle I/M program, which provides little benefit for NO<sub>x</sub>. In response to the AAM/GM comments, and because we do not believe that MOBILE5 can be used to appropriately correct for such a bias, we have eliminated this separate adjustment.

Subissue (2): We are retaining our adjustment of these raw data to account for the concern that vehicles tested in voluntary recruitment-based emission test programs are not fully representative of the entire in-use fleet (the "high-emitter adjustment"); however, this adjustment is being reduced in response to the AAM/GM comments. The high-emitter adjustment is used solely in the calculation of the frequency of high emitters in the fleet; in effect, it serves to increase the number of high emitters in the voluntary recruitment-based FTP test sample. In developing overall emission rates, we first a) establish emission levels for normal and high emitters separately, then b) compare these levels to the average of the entire sample (normal and high emitters combined) as a function of mileage; this allows us to c) back-calculate the fraction of high emitters as a function of vehicle mileage. The high-emitter adjustment factor is in the form of a gram-per-mile emission increment which is added to the average of the entire sample (step (b)), as a function of vehicle mileage. This results in a larger fraction of high emitters when back-calculated through step (c); the increased number of high emitters are meant to "add back" the effect of those vehicles which otherwise would not participate in a voluntary recruitment-based testing program, as discussed below. The high-emitter adjustment does not affect our estimate of per-vehicle high emitter emission levels from step (a).

Our analysis of in-use emission rates for Tier 0 LDVs and LDTs for MOBILE6 found a clear difference between average emissions of vehicles tested in voluntary recruitment-based FTP emission testing programs, and of vehicles tested in I/M programs (in which

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<sup>42</sup>Ibid.

participation is mandatory).<sup>43</sup> This offset has been attributed to so-called "recruitment bias," in which owners of higher-emitting vehicles are less likely to respond to solicitations for participation in voluntary programs. For Tier 0 emission rates in MOBILE6, this offset was translated into a "high emitter adjustment factor", NO<sub>x</sub> emission rates for Tier 1 and later vehicles were developed based solely on data from voluntary recruitment-based FTP test programs. However, a direct comparison between data from these test programs and I/M data on Tier 1 vehicles (as was done for Tier 0 vehicles) cannot be performed; because of the relatively recent implementation of Tier 1 standards and the tendency for new vehicles to be waived from I/M participation early in their life, sufficient IM data are not available on Tier 1 vehicles to derive a high emitter adjustment in a manner similar to that for Tier 0 vehicles. However, because the FTP data used to generate the Tier 0 and Tier 1 NO<sub>x</sub> emission rates were collected within the same test programs, we believe it is necessary to apply a high emitter adjustment factor to the Tier 1 FTP data sample to account for the lack of representation of high emitters, as was done with the Tier 0 FTP data. The need for this adjustment is supported further by the elimination of an adjustment to account for the effects of California's I/M program on the Tier 1 NO<sub>x</sub> data sample (as discussed above), and the elimination of separate adjustments to account for the effects of emission tampering.<sup>44</sup>

In response to the AAM/GM comments, we have reevaluated how this NO<sub>x</sub> high emitter adjustment for Tier 1 and later vehicles should be derived, based on a comparison of average FTP emission results for Tier 0 and Tier 1<sup>45</sup> high emitters (defined as having emission levels exceeding two times the 50,000 mile FTP standard). Average Tier 1 FTP NO<sub>x</sub> emissions for high emitters were calculated from the EPA/AAM/ARB data sample used to develop our revised Tier 1 NO<sub>x</sub> emission rates, as discussed under Issue 27.4 (K). In all, this sample contained 31 high-emitting vehicles. This Tier 1 average emission level was compared with average high-emitter emissions for 1988-1993 ported fuel injection (PFI) Tier 0 LDVs, as proposed for MOBILE6<sup>46</sup>. The following table presents this comparison:

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<sup>43</sup> Enns, et al, "Determination of Running Emissions as a Function of Mileage for 1981-1993 Model Year Light-Duty Cars and Trucks", EPA Draft MOBILE6 Report No. M6.EXH.001, March 1999.

<sup>44</sup> MOBILE5 included separate emission adjustments which accounted for the presence of emissions tampering. In MOBILE6 these adjustments will be eliminated since the high-emitter adjustment discussed above is presumed to include tampering effects.

<sup>45</sup> Tier 1 NO<sub>x</sub> emission rates were derived from 1988 and later LDVs and LDTs certified to a 0.4 gram per mile NO<sub>x</sub> standard; some of these vehicles were Federal Tier 1 vehicles, but most were California Tier 0 vehicles. For this analysis, we include the California vehicles in our definition of "Tier 1" because they were certified to the same standard as the Federal Tier 1 standard.

<sup>46</sup> Enns, et al, "Determination of Running Emissions as a Function of Mileage for 1981-1993 Model Year Light-Duty Cars and Trucks", EPA Draft MOBILE6 Report No. M6.EXH.001, March 1999; Glover and Carey, "Determination of Start Emissions as a Function of Mileage and Soak Time for 1981-1993 Model Year Light-Duty Vehicles", EPA Draft MOBILE6 Report No. M6.STE.003, March 1999.

**Table 27.4.H-1: Derivation of Revised NO<sub>x</sub> High-Emitter Adjustment**

	<b>Average FTP NO<sub>x</sub> Emissions - High Emitters</b>
Tier 0	2.96 g/mi <sup>47</sup>
Tier 1	1.29 g/mi
Percent Reduction:	56%

As shown, average high emitter emissions for Tier 1 vehicles are 56 percent lower than for Tier 0 vehicles. Thus, the high emitter adjustment applied in the derivation of Tier 1 and later emission rates was calculated by reducing the high emitter adjustment for 1988-1993 PFI Tier 0 LDVs by 56 percent, versus 25 percent used in the NPRM. This modification was incorporated into the development of revised emission rates discussed under Issue 27.4 (K), and our updated Tier 2 Model discussed under Issue 27.4 (M)(1).

Subissue (3): We are not revising our approach for estimating emissions from high-emitting post-Tier 1 cars and trucks. The modeling of appropriate emission levels for Tier 1 and later high emitters is a matter of technical judgment, since sufficient data on post-Tier 1 high-emitting vehicles are not available. GM's comments on how these vehicles should be modeled reflect their own judgment, and no data or analysis are provided to substantiate their position. The commenters state that EPA failed to analyze available industry data; in fact, available industry data does not address this issue, since the dataset contains no post-Tier 1 LDVs or LDTs. Nevertheless, based on their comments we reassessed this issue using two approaches. First, we analyzed engine-out emissions to assess the implications for catalyst performance under our assumption that average high-emitter emissions for post-Tier 1 vehicles will be higher relative to their 50,000 mile certification standard than Tier 1 vehicles. Second, we analyzed the trend in high emitter emissions between Tier 0 and Tier 1 in the combined EPA/AAM/ARB dataset discussed under Issue 27.4 (K), to determine whether high emitter emissions should be reduced in proportion to changes in the certification standard. We believe that both of these approaches, detailed below, support the underlying technical rationale behind our original approach for estimating high emitter emissions.

The assumption behind our estimates of post-Tier 1 high-emitter emissions is that average emissions from malfunctioning vehicles will not be reduced in proportion to the lowering of certification standards; we estimated that high-emitter emissions for post-Tier 1 vehicles would only be reduced by ½ of the reduction in the 50,000 mile certification standards, relative to Tier 1. For example, LEV LDV high-emitter emissions were derived by reducing Tier 1 high-emitter emissions by 25 percent, or ½ of the 50 percent reduction achieved by going from 0.4 g/mi (the Tier 1 50,000 mile certification standard) to 0.2 g/mi (the LEV standard). This approach was based on our judgment that post-Tier 1 vehicles are increasingly reliant on catalyst conversion efficiency to maintain compliance with the standard, so that tailpipe emissions are increasingly sensitive to degradation of catalyst conversion efficiency. To support this judgment, we analyzed available engine-out emission data for Tier 1 vehicles tested as part of the Supplemental Federal Test Procedure (SFTP) review project, and a combined sample of LEV/ULEVs tested as part of the auto industry's sulfur test program. This analysis shows that LEV/ULEV high emitters

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<sup>47</sup>Calculated values for 1988-1993 Tier 0 PFI NO<sub>x</sub> high emitters vary slightly by mileage; this represents the value at 68,000 miles, the average in-use mileage for LDVs based on MOBILE6 travel fraction.

would actually have better catalyst conversion efficiency than Tier 1 high emitters, although their emission levels would be higher relative to the 50,000 mile standard than Tier 1 high emitters. This is illustrated in the following table:

**Table 27.4.H-2: Evaluation of Post-Tier 1 High-Emitter Emission Assumptions**

<b>NO<sub>x</sub></b>	<b>Engine-Out FTP NO<sub>x</sub> Emissions</b>	<b>Projected catalyst efficiency at 50K standard</b>	<b>Projected catalyst efficiency at high emitter emission rate</b>
Tier 1	2.33 g/mi <sup>48</sup>	83%	45%
LEV/ULEV	2.59 g/mi <sup>49</sup>	92%	63%
<b>HC</b>	<b>Engine-Out NMHC Emissions</b>	<b>Projected catalyst efficiency at 50K standard</b>	<b>Projected catalyst efficiency at high emitter emission rate</b>
Tier 1	1.90 g/mi <sup>4</sup>	87%	12%
LEV/ULEV	1.50 g/mi <sup>5</sup>	95%	18%

As shown, the reductions necessary to meet the tighter LEV standards come primarily from improvements in the catalyst. This means that similar drops in catalyst conversion efficiency will more adversely affect the emissions of LEVs, and result in higher emissions relative to the 50,000 mile certification standard than for Tier 1 vehicles. This analysis shows that degradation in NO<sub>x</sub> catalyst efficiency between normal and high emitters would actually be less for LEVs than for Tier 1 vehicles under our assumption that LEV high-emitter emissions would only be reduced by ½ of the reduction in the 50,000 mile certification standards.

A second approach to assessing our estimates of high emitter emissions is to analyze trends in available Tier 0 and Tier 1 data (this analysis was performed only for NO<sub>x</sub>, since available Tier 1 data for HC is from relatively new vehicles and does not include any high emitters). Although the combined EPA/AAM/ARB dataset does not include any post-Tier 1 vehicles, the trend towards less-than-proportional decreases in high emitter emissions as certification standards are lowered does bear out based on a very limited sample of catalyst-equipped (1988 and later) LDV/LDT1 high emitters:

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<sup>48</sup>Source: "Supplemental FTP Emissions Database", CD distributed by AAMA/AIAM, January 1997 (21 vehicles).

<sup>49</sup>Source: AAMA Sulfur Test Program (9 vehicles). Higher NO<sub>x</sub> engine-out results for LEVs are considered a function of manufacturer's attempts to improve HC performance and catalyst light-off through engine calibration strategies, such as a leaner fuel mixture at startup (as indicated by reductions in engine-out HC).

**Table 27.4.H-3: High Emitter Emissions At Decreasing Standard Levels**

1 NO <sub>x</sub> Standard	2 Percent reduction in certificatio n standard	3 High emitter sample size	4 Average emissions (g/mi)	5 Percent reduction in average high emitter emissions from previous standard level	6 Percent proportional (Column 5 / Column 2)
1.0 (Tier 0)	-	8	2.46	-	
0.7 (Cal Tier 0)	30% (from 1.0 standard)	3	1.85	25%	83%
0.4 (Tier 1)	43% (from 0.7 standard)	31	1.29	30%	70%

Column 2 in the table above shows the percent reduction in certification standard level, from Tier 0 through Tier 1; Column 5 shows the percent reduction in high-emitter emissions at these standard levels. The fact that the values in Column 5 are lower than in Column 2 means that emission levels for high emitter are not reduced in proportion to the certification standard, which supports the underlying assumption for our development of post-Tier 1 high-emitter emission rates. Column 6 shows the decrease in high emitter emissions relative to the decrease in certification standards (comparable to our estimate of 50 percent proportional for post-Tier 1 high emitters). This value decreases as the standard level drops from 1.0 g/mi to 0.7 g/mi, and 0.7 g/mi to 0.4 g/mi; in other words, decreases in high emitter emissions become less and less proportional to decreases in the standard, for lower standards. We expect this trend to continue for post-Tier 1 standards, based on our analysis of engine-out emissions for post-Tier 1 vehicle presented above. Extrapolating these results, we believe our estimate of only a 50 percent proportional drop in high emitter emissions as standards are reduced beyond Tier 1 levels is reasonable.

Our analyses as presented above, in combination with the fact that the commenters did not provide any new data to substantiate their position, compels us not to change our methodology for calculating high emitter emissions for post-Tier 1 LDVs and LDTs.

**COMMENT H.3:** EPA has not explained how its emission rates models for Tier 1 and LEV vehicles with OBD, in both I/M and non I/M areas, compare with California's emission rate models for the same vehicles. EPA's emission rates are significantly higher than those used by California. **(General Motors Corporation (IV-D-209), vol. 2, p. 25)**

**RESPONSE:** EPA and ARB develop their inventory models independently, and although information, data and knowledge are shared openly between the two agencies, neither agency is compelled to reconcile their model with the other. Differences in approach do and will exist between the two models, particularly with regard to estimates of future emission levels (for which no in-use emission data are available). The commenters' contention that EPA should reconcile our emission rates with ARB does not appear to be based on a thorough comparison of the two models and their underlying data. Nevertheless, in response to this comment we have generated a thorough comparison of our emission rates with ARB's emission rates as estimated from ARB's CALIMFAC



model.<sup>50</sup> Contrary to the commenters' analysis, we found that our average light-duty emission rates are comparable to ARB's emission rates when considered in the proper context.

AAM's comments provide a graphical comparison between ARB emission rates and the EPA rates for LDVs only, and conclude from this that our NO<sub>x</sub> and HC emissions rates are much higher than ARB's. Based on this comparison, the commenters' contend that had we adopted the ARB emission rates, our projection of future nonattainment may be reduced. To investigate this issue, we compared our emission rates with estimates of the ARB emission rates by computing emissions produced over the lifetime of an average vehicle;<sup>51</sup> this computation is relevant to how emission rates are used in an inventory model, and hence we consider it to be a more appropriate means of comparison. We made this comparison not only to LDVs, but also to LDTs below 6,000 pounds (LDT1/2) and above 6,000 pounds (LDT3/4), and considered average overall light-duty emissions weighted by the mix of vehicle miles traveled (VMT) in 2007. Although our NO<sub>x</sub> and HC emission rates have been updated since the proposal (Issue 27.4.(K)), we made this comparison with our emission rates as initially proposed since these are reflected in our final rule air quality assessment. The results of this analysis are shown in Table 27.4.H-4 for vehicles and trucks which comprise the NLEV (baseline) vehicle program, which we are assuming would be in place in 2007 in the absence of Tier 2/Sulfur control (LEV LDVs and LDT1/2s, and Tier 1 LDT3/4s).

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<sup>50</sup>"Comparison of EPA, ARB and AIR Emission Rates", Memorandum from John Koupal to Docket A-97-10.

<sup>51</sup>Ibid. For this analysis, the methodology for computing lifetime tons in the Tier 2 cost/effectiveness calculations was used, except that a "discount factor" was not applied as this is an economic method for expressing lifetime emissions in terms of net present value.

**Table 27.4.H-4: Comparison of EPA and ARB Emission Rates**

	<b>NO<sub>x</sub></b> <b>(Lifetime Tons,</b> <b>Average Vehicle)</b>		<b>HC</b> <b>(Lifetime Tons,</b> <b>Average Vehicle)</b>	
	<b>No IM</b>	<b>IM</b>	<b>No IM</b>	<b>IM</b>
<b>LEV LDV</b>				
EPA (Proposal)	0.049	0.038	0.027	0.015
ARB	0.041	0.036	0.016	0.012
<b>Difference</b>	<b>16%</b>	<b>5%</b>	<b>41%</b>	<b>20%</b>
<b>LEV LDTs &lt; 6000 lbs (LDT1/2)</b>				
EPA (Proposal)	0.115	0.091	0.053	0.029
ARB	0.107	0.093	0.035	0.024
<b>Difference</b>	<b>7%</b>	<b>-2%</b>	<b>34%</b>	<b>17%</b>
<b>Tier 1 LDTs &gt; 6000 lb (LDT3/4)</b>				
EPA (Proposal)	0.265	0.232	0.132	0.092
ARB	0.327	0.275	0.178	0.110
<b>Difference</b>	<b>-23%</b>	<b>-19%</b>	<b>-35%</b>	<b>-20%</b>
<b>Composite Light-Duty Difference<sup>52</sup></b>	<b>-2%</b>	<b>-7%</b>	<b>11%</b>	<b>3%</b>

As shown, our comparison of the EPA and ARB rates indicates that when composite light-duty emissions are considered, particularly in I/M areas, the models are very comparable. The commenters' contend that if ARB's emission rates were used, our air quality assessment may result in fewer nonattainment areas. Given that most (if not all) of the areas projected to exceed the one hour ozone standard are I/M areas, the differences shown in the above table do not support the commenters argument; in fact, the opposite would more likely true.

Our analysis suggests that a more significant source of difference between our inventory modeling and AAM's are missteps in the commenters' air quality analysis which resulted in an underestimation of NO<sub>x</sub> and HC baseline emissions, and emission reductions due to Tier 2. As discussed under issue 27.4(M)(1), differences in the underlying emission inventories generated for the EPA and AAM/GM air quality analysis are more likely due to these procedural inaccuracies than any real difference in basic emission rates.

**COMMENT I:** EPA's new Tier 2 model provides emission projections based on the

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<sup>52</sup>Computed by comparing average emission factors weighted by our estimate of VMT mix in 2007, as presented in Table 27.4.M-2.

inaccurate assumption that sulfur controls are not an appropriate control strategy for the current fleet. Sulfur controls will have large positive impacts on the emissions of existing vehicles. **(General Motors Corporation (IV-D-209), vol. 2, p. 17-18)**

**RESPONSE:** Our response to this comment is contained under Issue 24.2(E).

**COMMENT J.1-J.2:** In EPA's new Tier 2 model, light truck emissions are overestimated. EPA applied the relative ratio of in-use emission rates to emission standards developed from cars and used this ratio to estimate the in-use emissions for light trucks. As a result, light trucks are assumed to have the same ratio of their in-use emissions to their standards for NLEVs, Tier 1 vehicles, and other passenger vehicles. This assumption is not supported by data from any emissions database. GM notes that their certification data indicate that light trucks have certification levels much closer to car levels than their own standards. EPA is arguing that light truck emissions are very low for the purpose of establishing the Tier 2 standards, but drops this assumption when assessing the in-use emissions and assigns unrealistically high emissions to light trucks by deriving their assumptions from the emissions standards instead of actual certification experience. In developing emission rates for Tier 1 and NLEV LDTs, EPA's assumptions lead to LDT deterioration rates that are significantly higher than the passenger car deterioration rates. EPA also did not examine in-use LDT data. An analysis of the industry data on deterioration rates for light duty cars and LDTs shows that the rates for trucks are less than or equal to the rates for cars, in spite of the difference in emission standards. EPA should incorporate these data into their Tier 2 model (data were provided by AAM in Table 3 - Linear Regression of Industry In-Use Light Duty Truck Data). **(Alliance of Automobile Manufacturers (IV-D-115), p. 37-39, General Motors Corporation (IV-D-209), vol. 2, p. 18-19, 24)**

**RESPONSE:** In response to the AAM/GM comments, we reassessed the issue of Tier 1 and later LDT emission rates using available in-use Tier 1 LDT data. Our analyses, presented below, support our original assumptions about LDT in-use performance, and hence our approach to developing LDT emission rates will not be revised. In contrast, the commenters' argument that Tier 1 and later LDTs should be assigned lower in-use emissions are based on certification data and in-use data on primarily pre-Tier 1 LDTs. The analyses performed by the commenters' are not supported by available in-use data on Tier 1 LDTs.

AAM/GM present NO<sub>x</sub> deterioration rates for a range of LDV and LDT standard levels, contending that these results show LDT deterioration rates to be relatively consistent with those for LDVs despite higher emission standards. There are several problems with this analysis. First, aside from the 0.4 gram/mile standard levels (to be discussed later), all data presented for this analysis are for pre-Tier 1 standard levels; thus, the industry analysis does not pertain to the in-use performance of Tier 1 and later LDTs, and no explanation is given by the commenters as to why the data they present are relevant. Second, no attempt was made by the commenters to separate the effect of "high emitters" on their deterioration rates; the deterioration rates within each standard level will depend significantly on the emission level and frequency of high emitters in each sample. Without this step, the commenters' deterioration rates cannot be reasonably compared on a consistent basis across standard level. Finally, the commenters do not account for the fact that in some cases, the same pre-Tier 1 LDT standard for heavier trucks applied to multiple weight classes (as defined under the Tier 1 standards). The data they present for the heavier truck standards likely include up to three LDT weight classes. Without knowing the breakdown of weight class within each standard, it is not possible to evaluate the relative stringency of Tier 0 and Tier 1 emission standards for a given weight class. Given these shortcomings, the in-use deterioration analysis presented by the commenters does not

provide meaningful insight into the performance of Tier 1 and later LDTs.

In general, sufficient in-use data do not exist to empirically establish emission rates for Tier 1 and later LDTs; some level of judgment about how these vehicles will perform in-use is therefore required. Our judgment is that beginning with Tier 1 standards, the emission control systems hardware equipped on LDTs are similar to those on LDVs, and thus will deteriorate and/or malfunction at the same rate as LDVs. GM presents certification data showing an increased certification margin for heavier LDTs, relative to LDVs. We do not believe that certification data is adequate for determining average in-use emissions from light-duty vehicles and trucks, however. This is made clear by GM's explanation that increased certification margin is needed in response to "these vehicles wider range of severity in-use" - acknowledging that the manner in which a vehicle is operated in-use can affect its real-world emissions and emission deterioration rate independently from its certification emission level. The level of the certification margins themselves, when compared against in-use data, further reinforce that light-duty certification results are not good predictors of actual in-use emissions and emissions deterioration. To assess this issue, we evaluated in-use data used to establish NO<sub>x</sub> emission rates for Tier 1 LDVs and LDT1s and compared the results to certification data from Tier 1 LDVs and LDT1s. We included only "normal emitters" from the in-use data because these vehicles provide a more appropriate comparison with certification data, which is meant to predict the emissions of vehicles without serious malfunctions. The results are shown in the table below:

**Table 27.4.J-2: Comparison of Certification and In-Use data for LDVs and LDT1s.**

	<b>Certification Compliance Margin, 50,000 miles</b>	<b>In-Use Compliance Margin (Normal Emitters), 50,000 miles</b>	<b>In-Use Sample Size</b>
LDV	57%	26%	1115
LDT1	64%	23%	52

Although a meaningful comparison can only be made between LDT1s and LDVs (since adequate in-use data for heavier Tier 1 LDTs is not available at present), this comparison shows the problem with using certification compliance margin as a basis for in-use emissions. The compliance margin at certification is somewhat higher for the LDTs, which is consistent with the AAM/GM analysis. The in-use results, however, reflect the opposite; the compliance margin at 50,000 miles is somewhat less for the LDTs. To investigate further, a multiple regression analysis was performed on NO<sub>x</sub> emissions for the entire LDV/LDT1 normal emitter sample using a model with vehicle class (LDV or LDT) as a factorial and mileage and the cross product of mileage and class as continuous variables. The purpose of this test was to determine whether there is a statistically significant difference between either the intercept or deterioration rate for LDVs and LDTs certified to the same standard. The results are shown in the table below:

**Table 27.4.J-3: Results of Multiple Regression Analysis - LDV vs. LDT at 0.4 g/mi Standard**

Parameter	P-Value	Significant?
Intercept	<0.0005*	Yes
Mileage	<0.0005*	Yes
Vehicle Class (Factorial)	0.254	No
Vehicle Class * Mileage	0.447	No

\* P-Value equals zero to three significant digits

The lack of significance for vehicle class and class/mileage cross product indicates that there is no statistically significant difference in the intercept or deterioration rate for in-use LDVs and LDTs certified to the same Tier 1 standard, despite the difference in certification compliance margin.

An analysis of in-use emissions from heavier LDTs was performed on a sample of 50 discrete tests of 38 late-model Tier 1 LDT2s and LDT3s tested by EPA (37) and ARB (1). The majority of these vehicles were under 3 years old when tested and had an average mileage below 30,000 miles (the maximum mileage was 93,000). The emission levels of this sample reflected its newness; all tests complied with the 50,000 mile standard NO<sub>x</sub> standard of 0.7 grams per mile. Overall, we do not consider this sample adequate for generating in-use emission rates directly; but, it is useful for comparing emission performance relative to the standard and early in a vehicle's life with a sample of comparable Tier 1 LDVs. To determine whether the emission performance of the LDTs relative to the 0.7 g/mi standard was different from the performance of comparable Tier 1 LDVs relative to the 0.4 g/mi standard, we performed a multiple regression analysis on a sample consisting of the LDT2/3s and a subset of Tier 1 LDVs which complied with the 0.4 gram/mile standard. The dependent variable for this analysis was "headroom", calculated by dividing each emission test by the standard (to normalize across the two standard levels). Vehicle class (LDV or LDT) was a factorial and mileage and the cross product of mileage and class were continuous variables. The results are shown below:

**Table 27.4.J-4: Results of Multiple Regression Analysis - Tier 1 LDV vs. Tier 1 LDT2/3**

Parameter	P-Value	Significant?
Intercept	<0.0005*	Yes
Mileage	<0.0005*	Yes
Vehicle Class (Factorial)	0.813	No
Vehicle Class * Mileage	0.912	No

\* P-Value equals zero to three significant digits

The lack of significance for vehicle class and class/mileage cross product indicates that there is no statistically significant difference in the intercept or deterioration rate relative to the standard for a sample of comparable Tier 1 LDVs and LDT2/3s, despite a higher emission standard for the LDT2/3s. This provides strong support for our approach to generating Tier 1 and later emission rates for heavier LDTs, particularly given that the commenters did not assess any in-use Tier 1 data for these trucks.

The commenters' claim in their written comments that the AIR Tier 2 inventory model adopts ARB's CALIMFAC rates across the board; however, this turns out not to be the case for Tier 1 LDT3/4 NO<sub>x</sub> emissions rates.<sup>53</sup> As discussed under issue 27.4(H)(3), the actual ARB emission rates for these trucks appear to be higher than ours. AIR instead developed their own emission rates for these trucks which are lower than ARB's. No explanation has been provided by the commenters as to how these rates were developed, why they are appropriate, or why for this one case the ARB emissions rates were not utilized. The AIR NO<sub>x</sub> emission rates for Tier 1 LDT3/4s are in fact slight higher than ours for the non-I/M case,<sup>54</sup> which would seem to directly contradict the commenters' claim that our emission rates for these vehicles are "unrealistically high" (GM comments, Volume 2, page 19). As discussed under Issue 27.4 (M)(1), the AIR model projects lower emissions from these vehicles in I/M areas due to the unrealistic assessment of I/M benefits and outdated VMT estimates, rather than differences in the emission rates themselves.

Based on our comparison of available data on Tier 1 LDTs and Tier 1 LDVs, and the absence of such data or analysis in the AAM/GM comments, we have chosen not to revise our approach for generating LDT emission rates based on Tier 1 LDV emission rates. However, our overall Tier 1 and later LDT emission rates have been updated in conjunction with our revision to Tier 1 LDV emission rates, as discussed under Comment 27.4.K.

**COMMENT J.3:** Light duty truck emissions were not addressed consistently. In the context of EPA's analysis of certification data for cars and light trucks, EPA should indicate how many of the "families" were cars and how many were trucks and should also reveal the average certification emissions of the cars versus trucks and the average in-use emissions of cars versus trucks. EPA should also indicate how the certification emission levels compare to the in-use emission levels used in its analysis. The modeling with respect to LDTs is flawed. For normal emitters, EPA assumed that normal emissions for post Tier 1 LDVs and Tier 1 and later LDTs will on average maintain the same performance relative to the applicable 50,000 mile standard as Tier 1 LDVs but does not indicate what evidence it has for this assumption, particularly for trucks. (**General Motors Corporation (IV-D-209), vol. 2, p. 23**)

**RESPONSE:** The commenters urge us to draw a comparison between our estimates of in-use emissions for trucks, and certification data used to demonstrate feasibility of our Tier 2 certification standards. The purpose of these analyses are fundamentally different, and we do not see the merit of such a comparison. The analysis based on certification data was used as part of demonstrating the feasibility of the Tier 2 standards looking at current technology that performs well, and projecting its development and expansion through technology advancement. The process of determining average in-use emissions is very different, because the intent is to estimate average emissions for the fleet as a whole, including vehicles which fall outside the scope of the compliance process. Given this, there is little point in comparing our assessment of in-use emission levels and our demonstration of feasibility based on certification results for a subset of the best-performing vehicles. In addition, there is nothing in our approach to demonstrating feasibility that would imply that LDTs would have lower in-use emissions than LDVs. Our response to comments concerning our derivation of LDT in-use emission rates is contained under the previous issue.

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<sup>53</sup>"Log of Personal Communications With Air Improvement Resource, Inc.", Memorandum from John Koupal to Docket A-97-10.

<sup>54</sup>"Comparison of EPA, ARB and AIR Emission Rates", Memorandum from John Koupal to Docket A-97-10.

**COMMENT K:** EPA's new Tier 2 model relies primarily on the ARB surveillance data and as a result, overestimates NO<sub>x</sub> emissions from Tier 1 vehicles. To estimate NO<sub>x</sub> emissions from Tier 1 vehicles, EPA ignored data on over 800 cars tested by the auto industry, which would have significantly reduced their estimate of NO<sub>x</sub> emissions. EPA based their estimates on the ARB surveillance data alone, which purposely target potentially failing vehicles and thus, are not usable for estimating average emission factors. EPA should include all relevant data and re-estimate the NO<sub>x</sub> emissions from Tier 1 vehicles. (**Alliance of Automobile Manufacturers (IV-D-115), p. 37-40, General Motors Corporation (IV-D-209), vol. 2, p. 22**)

**RESPONSE:** In response to AAM/GM's comments, the NO<sub>x</sub> emission rates for Tier 1 and later LDVs and LDTs were reanalyzed with the industry data, as well as EPA and ARB data collected since the NPRM analysis was performed. In all, 1,167 1988 and later LDVs and LDTs certified to a 0.4 gram per mile NO<sub>x</sub> standard were used to generate the new emission rates, versus 186 in the NPRM. The emission rates which result from these data are not significantly lower than those used in the proposal, as contended by the commenters. This is because the commenters' analysis of the EPA, ARB and industry datasets did not account for the frequency of "high emitters" in each sample, which drives the average emission rates presented in their comments. The industry sample appears to consist predominantly of vehicles under four years of age, and as a result contains a very low percentage of high emitting vehicles. In contrast, the ARB dataset covers a more representative range of vehicle age and mileages, and hence a higher proportion of high emitters (the commenters contend that the ARB targets high emitting vehicles, but this contention was not substantiated by the commenters and has been refuted by ARB staff<sup>55</sup>).

Updated NO<sub>x</sub> emission rates for Tier 1 LDVs were developed using the combined EPA, ARB and industry datasets using the same process as for the proposed rates,<sup>56</sup> as summarized in the following steps:

1. Vehicles were subdivided into "normal" and "high" emitters according to a threshold of 2.0 times the FTP standard (0.8 grams per mile).
2. A linear regression was fit through the normal emitter data to generate the normal emitter emission rate
3. The high emitter emission rate was determined by taking the average emissions of all high-emitting vehicles
4. The sample average emission rate was determined by fitting a linear regression through the entire sample (normal and high emitters), then adding the revised high emitter adjustment factor (discussed under Issue 27.4(H)(2)).
5. The frequency of high emitters as a function of vehicle mileage was back-calculated based on the results of Steps (2) through (4).

The resulting emission rates have a lower intercept, but higher deterioration rate than the emission rates used in the proposal, as shown in Table 27.4.K-1:

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<sup>55</sup> "Log of Personal Communication with ARB Regarding The ARB Surveillance Program", Memorandum from John Koupal to Docket A-97-10.

<sup>56</sup> Koupal and Glover, "Determination of NO<sub>x</sub> and HC Basic Emission Rates, OBD, and I/M Effects for Tier 1 and later LDVs and LDTs", Draft Final MOBILE6 Report M6.EXH.007, December 1999.

**Table 27.4.K-1: NO<sub>x</sub> Basic Emission Rates for Tier 1 LDVs**

	<b>Normal Emitter Intercept (g/mi)</b>	<b>Normal Emitter Deterioration Rate (g/mi per 10,000 miles)</b>	<b>High Emitter Average (g/mi)</b>
Proposal	0.265	0.0147	1.278
Updated	0.153	0.0294	1.294

Although not discussed in the AAM/GM comments, our HC emission rates were also revised subsequent to the final rule air quality analysis, to correct an error in the high emitter frequency rates which overestimated HC emission rates for Tier 1 and later vehicles.<sup>57</sup>

Table 27.4.K-2 presents comparison of average lifetime emissions for vehicles and trucks which comprise the NLEV (baseline) vehicle program for NO<sub>x</sub> and exhaust HC. The updated emission rates also reflect our revised approaches to the high-emitter adjustment factor (for NO<sub>x</sub>) and OBD repair levels, as discussed under Comment 27.4.H.1-H.3:

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<sup>57</sup>Ibid.



**Table 27.4.K-2: Comparison of Proposed and Revised Basic Emission Rates**

	<b>NO<sub>x</sub></b> <b>(Lifetime Tons, Average Vehicle)</b>		<b>HC</b> <b>(Lifetime Tons, Average Vehicle)</b>	
	<b>No IM</b>	<b>IM</b>	<b>No IM</b>	<b>IM</b>
<b>LEV LDV</b>				
Updated	0.044	0.033	0.022	0.013
Proposal	0.049	0.038	0.027	0.015
<b>Difference</b>	<b>-11%</b>	<b>-15%</b>	<b>-23%</b>	<b>-15%</b>
<b>LEV LDTs &lt; 6000 lbs (LDT1/2)</b>				
Updated	0.111	0.087	0.043	0.024
Proposal	0.115	0.091	0.053	0.029
<b>Difference</b>	<b>-4%</b>	<b>-5%</b>	<b>-23%</b>	<b>-21%</b>
<b>Tier 1 LDTs &gt; 6000 lb (LDT3/4)</b>				
Updated	0.263	0.227	0.115	0.082
Proposal	0.265	0.232	0.132	0.092
<b>Difference</b>	<b>-1%</b>	<b>-2%</b>	<b>-15%</b>	<b>-12%</b>
<b>Composite Light-Duty Difference<sup>58</sup></b>	<b>-4%</b>	<b>-6%</b>	<b>-20%</b>	<b>-16%</b>

These results show that with the incorporation of a lower high-emitter adjustment factor, more benefit for OBD repair and emission rates based on the larger EPA/AAM/ARB dataset, average light-duty NO<sub>x</sub> emissions are reduced by four to six percent. Our corrected HC emission rates result in a decrease in total light-duty exhaust HC emissions of 16 to 20 percent.

The decrease in NO<sub>x</sub> and HC emissions resulting from our updated emission rates are more than offset by several other emissions model revisions being made in response to comments or new data. Updates to our Tier 2 inventory model (made subsequent to the inventory and air quality analysis presented in this rule) indicate that our estimates of baseline emissions and emission reductions are significantly underestimated for both NO<sub>x</sub> and HC. These updates were made to incorporate the following components:<sup>59</sup>

1. New data on LEV sulfur sensitivity, which indicates that the effects of sulfur on emission performance are significantly higher after long-term exposure to sulfur.

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<sup>58</sup>Computed by comparing average emission factors weighted by our estimate of VMT mix in 2007, as presented in Table 27.4.M-2.

<sup>59</sup> "Determination of Light-Duty Emission Inventory Estimates in the Final Rulemaking for Tier 2 and Sulfur Standards", Memorandum from John Koupal to Docket A-97-10.

2. New NO<sub>x</sub> basic emission rates for Tier 1 and later LDVs and LDTs, based on a significantly larger sample of in-use vehicles, as discussed earlier in this Comment.
3. Revised HC basic emission rates for Tier 1 and later LDVs and LDTs, based on corrections made to the original analysis
4. Revised estimates of off-cycle emissions and benefits of the SFTP rule
5. Incorporation of updated speed correction factors planned for use in MOBILE6
6. Incorporation of updated activity data (e.g. soak distribution, starts per day) factors planned for use in MOBILE6
7. A more complete accounting of sulfur "irreversibility"

With these updates, our best estimate of nationwide light-duty emissions, and emission reductions due to the Tier 2 rule increase significantly, as shown in Tables 27.4.K-3 and 27.4.K-4:

**Table 27.4.K-3:  
Updated Tier 2 Model Projections of 47-State Light-Duty NO<sub>x</sub> Emissions  
(Annualized Ozone Season Day Tons)**

	Model Used for Air Quality Analysis			Updated Model		
	Base	Control	Reduction	Base	Control	Reduction
2007	3,095,698	2,239,227	856,471	3,681,990	2,725,478	956,512
2030	3,704,747	909,196	2,795,551	5,323,860	1,274,173	4,049,687

**Table 27.4.K-4:  
Updated Tier 2 Model Projections of 47-State Light-Duty VOC Emissions  
(Annualized Ozone Season Day Tons)**

	Model Used for Air Quality Analysis			Updated Model		
	Base	Control	Reduction	Base	Control	Reduction
2007	2,026,945	1,883,438	143,507	2,544,842	2,282,668	262,174
2030	2,108,765	1,707,797	400,968	2,845,573	2,039,230	806,343

We believe that our revised approach to generating emission rates adequately accounts for the concerns raised by this comment. When taken in the context of our other modeling changes, the updated emission rates will not reduce our projections of emissions and emissions reductions in the analysis conducted to support the Tier 2/Sulfur standards.

**COMMENT L:** In EPA's new Tier 2 model, the emission rates for LEVs are much higher than the ARB's both for non-I/M and I/M areas. EPA should use California's much lower emission rate estimates for LEVs in its ozone modeling to determine the need for the Tier 2 standards. (**Alliance of Automobile Manufacturers (IV-D-115), p. 37-40**)

**RESPONSE:** Our response to this issue is contained under Issue 27.4.H.3.

**COMMENT M.1:** To address the problems associated with EPA's new Tier 2 model, a revised air quality modeling approach was developed for assessing the impacts of the

EPA's proposed Tier 2 standards as well as other potential mobile source emission control programs. This work was conducted by Air Improvement Resources, Inc. (AIR), Alpine Geophysics, LLC, and ENVIRON International Corporation. AIR developed revised mobile source inventories as inputs into the Alpine and ENVIRON Urban Airshed Model (UAM) and fine grid air quality models. The AIR MOBILE model included adjustments to correct the problems associated with EPA's MOBILE5 model (i.e. provides more realistic assumptions regarding in-use emissions from current vehicles, effects of OBD systems on in-use emissions, effect of low-sulfur on LEV emissions, useful life, SFTP control of off-cycle emissions, and in-use LDT emission reductions resulting from Tier 2). Alpine performed the EMS95 emissions modeling and the UAM-V using OTAG databases and used the development work done for the Regional Ozone Transport Rule (ROTR) as a foundation to estimate the impact of the proposed Tier 2/Sulfur controls on ozone levels in the OTAG domain. Alpine also developed a rollback adjustment factor (used to identify areas requiring additional modeling on a fine grid basis by ENVIRON). ENVIRON proceeded to conduct fine grid modeling (4 km) of three areas: Northeast, Lake Michigan, and Houston, and also developed predicted ozone design values using three separate approaches to the rollback method. GM provides a discussion and details regarding the revised modeling approach (as included in Attachments C, E, and F to their letter). Based on these revised modeling efforts, GM contends that there are only seven counties outside of California that are not expected to attain the ozone NAAQS by 2007, that the results confirm evidence of NO<sub>x</sub> disbenefits, that the proposed Tier 2 standards provide no air quality benefit compared to the Alliance proposal, and that the benefits of reducing sulfur to 5 ppm would outweigh any differences between the Tier 2 and Alliance proposal.

**(Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 5, General Motors Corporation (IV-D-209), vol. 2, p. 25-31)**

**RESPONSE:** Based on the concerns discussed below regarding the emissions modeling assumptions and estimates used by the commenters and the commenters' use of the rollback approach in isolation, EPA does not believe the modeling submitted by commenter is sufficient to contradict our determination regarding residual nonattainment in 2007.

Our review of the AIR inventory model (used as the basis for the ozone air quality analysis presented by the commenters) reveals important inaccuracies with regard to how it was used in the ozone analysis. We have detected at least two significant errors in the application of the AIR model, which lead to a significant underestimation of NO<sub>x</sub> and HC emissions in the commenters' ozone analysis. Our analysis suggests that in combination these errors resulted in an underestimation of emissions from light-duty cars and trucks in 2007 by about 23 percent for NO<sub>x</sub>, and 37 percent for exhaust HC, for areas with I/M programs. The emission inventories which form the basis of the commenter's ozone analysis are therefore significantly underestimated, which undermines the conclusions of the commenters' air quality assessment. Even if these errors were corrected, the AIR model would not account for the updated modeling inputs (discussed under Issue 27.4.(K)) which show that baseline emissions and emissions reductions are substantially higher than our initial estimates.

The two errors we have identified relate to how the AIR model was used in the GM ozone analysis. First, AIR's model was executed so that the MOBILE5-based correction factors were left intact, although the emission rates in the model were changed dramatically. In particular, this meant that relatively large I/M credits, generated to apply specifically to relatively high MOBILE5 non-I/M emission rates, were applied to the lower ARB non-I/M emission rates. This is simply incorrect, and leads to implausible outcomes, such as negative deterioration rates in some cases when MOBILE5 I/M credits are applied to the ARB emission rates. At a minimum, the AIR model should be internally consistent and use both the ARB non-I/M and "with IM" emissions rates, which would result in higher

emissions in I/M areas.

A second serious misstep in the execution of the AIR model for the ozone analysis is that the VMT (vehicle miles traveled) mix between LDVs and LDTs substantially underrepresents the contribution of LDTs to total VMT in light of sales trends over the past decade. The commenters' ozone modeling was based directly on inputs used for the Ozone Transport Assessment Group (OTAG), which assumes a VMT mix between LDVs and LDTs at a 1990 level.<sup>60</sup> As a result, the auto industry modeling does not account for the past and expected future growth in the share of VMT from light trucks. Table 27.4.M-1 presents the average VMT mix in 2007 between LDVs, LDTs under 6,000 pounds (LDT1/2) and LDTs above 6,000 pounds used in the AIR work, and our estimate in 2007 which reflects the rapid growth in light-duty truck sales and our projected continuation of this trend.

**Table 27.4.M-1: Comparison of AIR and EPA 2007 VMT Mix Assumptions**

	LDV	LDT1/2	LDT3/4
AIR	73%	18%	9%
EPA	44%	42%	14%

As shown, there is a significant discrepancy between the 1990-based OTAG VMT mix used by AIR, and our estimates reflecting current trends in truck sales. By overweighting LDVs and underweighting trucks, the auto industry modeling again underestimates overall light-duty emissions for NO<sub>x</sub> and VOC.

Taken in combination, we estimate that these methodological errors alone result in an underestimation of light-duty NO<sub>x</sub> emissions by 23 percent and exhaust HC emissions by 37 percent in 2007, for areas with I/M programs. We quantified the effect of these errors based on an analysis using our Modified MOBILE5b model<sup>61</sup> for a baseline case with conventional gasoline. We started with emissions predicted by this model in 2007 for a case without I/M. We then applied I/M benefits based on MOBILE5, to simulate the execution of the AIR model using MOBILE5 I/M credits. Finally, we combined the emission factors using the OTAG VMT mix presented in Table 27.4.M-1 above. The resulting composite light-duty emission factor was then compared to our estimate of an I/M scenario generated using the Modified MOBILE5b model, which reflects a more representative I/M credits and VMT mix. This analysis is shown in Tables 27.4.M-2 and 27.4.M-3 below.

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<sup>60</sup> "Quantification of Inventory Modeling Errors in the GM Air Quality Analysis", Memorandum from John Koupal to Docket A-97-10.

<sup>61</sup> Modified MOBILE5b incorporates the inputs of the NPRM version of the Tier 2 Model into the input file structure for MOBILE5b. This model was used in the development of the Tier 2 final rule air quality analysis, and is contained in the Tier 2 Docket. For more details, see the memo from John Koupal and Gary Dolce to Docket A-97-10 entitled "Development of On-Highway Inventory Adjustment Factors Used in the Tier 2 Final Rule Air Quality Analysis". The analysis presented in this section is documented in "Quantification of Inventory Modeling Errors in the GM Air Quality Analysis", Memorandum from John Koupal to Docket A-97-10.

**Table 27.4.M-2:  
Estimated Effect of AIR Modeling Errors on 2007 Light-Duty “With I/M” NO<sub>x</sub> Emissions**

<b>NO<sub>x</sub></b>	<b>LDV 2007 Emission Factor (g/mi)</b>	<b>LDT1/2 2007 Emission Factor (g/mi)</b>	<b>LDT3/4 2007 Emission Factor (g/mi)</b>	<b>Composite Light-Duty 2007 Emission Factor</b>
Modified MOBILE5b2 - No IM	1.019	1.136	1.692	-
w/ MOBILE5 I/M Credit	0.725	0.789	1.138	<b>0.77</b> (OTAG VMT Split)
Modified MOBILE5b2 - With IM	0.858	0.986	1.465	<b>1.00</b> (EPA VMT Split)

**Table 27.4.M-3:  
Estimated Effect of AIR Modeling Errors on 2007 Light-Duty “With I/M” Exhaust HC  
Emissions**

<b>Exhaust HC</b>	<b>LDV 2007 Emission Factor (g/mi)</b>	<b>LDT1/2 2007 Emission Factor (g/mi)</b>	<b>LDT3/4 2007 Emission Factor (g/mi)</b>	<b>Composite Light-Duty 2007 Emission Factor</b>
Modified MOBILE5b2 - No IM	0.382	0.469	0.922	-
w/ MOBILE5 I/M Credit	0.183	0.228	0.426	<b>0.21</b> (OTAG VMT Split)
Modified MOBILE5b2 - With IM	0.276	0.317	0.575	<b>0.34</b> (EPA VMT Split)

As shown, the light-duty emission factors which result when the incorrect I/M credits and VMT mix are applied in sequence are 23 percent lower for NO<sub>x</sub> and 37 percent lower for exhaust HC relative to a more representative scenario. While this analysis focuses on the effect of these errors on the baseline emission inventory, the reductions due to Tier 2 would also be underestimated, particularly due to the underrepresentation of LDT VMT. We therefore believe that these errors in the GM inventory modeling are an important contributor to their conclusion that the number of nonattainment areas without Tier 2 and the ozone benefit of Tier 2 would be smaller than we have projected.

The material on ozone modeling submitted by the commenters, having been prepared by the rollback method, is difficult to re-interpret according to our preferred exceedance method. However, it appears that if this modeling were interpreted by the exceedance method, it would indicate 2007 nonattainment in Baltimore and Washington, D.C. in addition to New York City, Chicago, Milwaukee, western Michigan, Baton-Rouge, and

Houston. Overall, we conclude that the material submitted by the automobile industry does not contradict the facts we have used to make our determinations or the actions we are taking.

**COMMENT M.2:** There is no need to establish standards effective in 2004 to address potential problems with nonattainment that will not develop until more than a decade later. EPA has claimed that the Tier 2 standards are needed to maintain the ozone NAAQS because NO<sub>x</sub> and VOC emissions would otherwise begin to increase in 2013 and 2015, respectively, after years of decline. Therefore, promulgating more stringent standards later in the next decade would provide all the maintenance cushion needed from reductions in mobile source emissions. There is no need to enact the costly Tier 2 proposal in the short-term. To support its claim, GM discusses this issue at length, with graphs showing projected trends of NO<sub>x</sub>, VOC, and CO emissions assuming the NLEV program is maintained in the near-term and the Tier 2 program is delayed until 2013. **(General Motors Corporation (IV-D-209), vol. 1, p. 26; vol. 2, p. 58-61)**

**RESPONSE:** The need for Tier 2 is based primarily on the need to first attain, then maintain the 1-hr ozone standard; maintenance of the standard for areas that do not need Tier 2 reductions to attain is an additional justification, but does not drive the determination of program start date. In addition to the criticisms of the AIR model emission rates discussed under the previous issue, we believe that the VMT growth rates used in the our final rule analysis is both conservative and closer to actual historical growth rates than the rate used in the AIR model. This is described in detail in the next response. As a result, the VMT estimates are another source of underprediction in AIRs model. Finally, as discussed in Chapter 3 of our Regulatory Impact Analysis, our updated Tier 2 model indicates that NO<sub>x</sub> emissions from light-duty vehicles and trucks will begin to increase significantly sooner than we projected in the NPRM.

**COMMENT N:** VMT growth may not be as high as EPA has assumed. Over the past several decades, a number of demographic changes occurred that allowed the growth in VMT to outstrip the growth in population (i.e. switch to multiple car families). Given the major demographic shifts that have already occurred, EPA's VMT growth assumption for the next several decades may not be sustainable. EPA should fully address the assumptions underlying its rate of VMT growth used in its projections and should compare the projections to population growth. One commenter also notes that EPA's assumptions for growth in VMT are incorrect and if better assumptions are substituted, the need for Tier 2 controls would be delayed by at least one year. The 72% increase in VMT EPA assumes between 2000 and 2030 is unsupportable. In its 1998 Annual Energy Outlook, DOE forecasts 1.5% VMT growth for cars and LDTs over the 1996-2020 period, which is based on projections of disposable income per capita, the ratio of miles driven by females to males, and the aging of the population. If this rate was used by EPA, the overall VMT growth would be 56% instead of 72%. In addition, historical VMT growth has fluctuated greatly and should not be used to estimate future VMT growth or driving behavior. GM provides additional discussion and analysis regarding the impact revised and more accurate estimates of VMT will have on estimates of both NO<sub>x</sub> emissions and future ozone levels. **(Alliance of Automobile Manufacturers (IV-D-115), p. 21-22, General Motors Corporation (IV-D-209), vol. 1, p. 25; vol. 2, p. 21-22, 55-58)**

**RESPONSE:** Growth in vehicle miles traveled (VMT) depends on the complex interactions of numerous demographic and economic factors in addition to population growth, including changes in age distribution of the human population, makeup of the workforce, commuting habits, geographical distribution of the population, patterns of leisure activity, disposable

income, confidence in the economy, and cost of transportation, among many others. Because of this complexity, and in particular because newer factors that influence growth in VMT such as the rise in two-income households and the continuing de-centralization of jobs away from urban cores were not predicted accurately, most VMT forecasts, including the DOE forecast mentioned by the commenters, have tended to under-predict VMT growth over the past 30 years.<sup>62</sup>

While some factors that affect VMT growth, such as increased participation of women in the workforce, may in fact be declining in importance, others, such as ever widening suburbanization, more suburb to suburb commuting, and rising disposable incomes combined with decreasing real costs of travel continue to be very important. Other factors which would result in increased rates of VMT growth, may not yet be obvious. For example, older age drivers are both healthier and wealthier than they ever have been in the past and are more likely to drive than older drivers in the past. This effect could become increasingly significant as baby-boomers begin to retire.

The commenters claim that historical VMT growth has "fluctuated greatly" and as a result is not necessarily a good predictor of future driving behavior. Actually, with the exception of three years of negative growth corresponding to oil shortages, light duty VMT growth over the past 30 years has been remarkably constant, averaging 2.7% per year, including those three years of negative growth. Over the past 10 years, annual VMT growth has ranged from a low of 1.2% to a high of 3.5% and has not dropped below 2.4% since 1990, averaging 2.6% during this period. Before that, one needs to go all the way back to 1981 to find another year with VMT growth less than 2.4% per year and to 1980 to find a year in which VMT growth was negative. Given this trend, the estimates we used in the proposal (which varied from 1.8% to 2.1% depending on the projected time period) should be viewed as conservative.

However, given the commenters concerns, we re-evaluated the inventory reductions associated with this rule using a methodology that gives an estimate of VMT growth that is more conservative than the one used in the proposal. For the final rule analysis, we used the National Emissions Trends methodology through 2020 and a simple linear extrapolation after that. As a result, average growth between 2007 and 2030 in the final rule analysis is only 1.7% per year (this is not a compound growth rate, but simply the total growth over that period divided by 23 years), a much more conservative growth estimate than was used in the proposal. Nonetheless, the emissions inventory reductions and air quality benefits that are calculated in this analysis continue to give strong support to this rule. Light duty vehicle VMT estimates used in the proposal and in this final rule are given in the following table.

**Table 27.4.N-1:  
Projected Annual Light Duty VMT (millions of miles)**

	2007	2030	Percent Change from 2007 to 2030
Proposal	2,463,240	3,791,544	54%
Final	2,486,919	3,486,155	40%

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<sup>62</sup>"Transportation Energy Demand Models: Why They Underestimate Greenhouse Gas Emissions", Jeff Alson, *et al*, U.S. EPA Office of Mobile Sources, paper presented at Climate Change Analysis Workshop, Springfield, VA, June 6-7, 1996.

**COMMENT O:** The need for further mobile source PM<sub>10</sub> reductions is questionable. EPA's claim in the SNPRM that the proposed rule will help reach and maintain the PM<sub>10</sub> standards for 15 million people cannot be adequately supported by current data. There are enormous uncertainties in EPA's projections of future PM<sub>10</sub> levels, which is acknowledged by EPA in the preamble. Given the small changes in PM<sub>10</sub> that EPA projects from the proposed rules, it is questionable whether changes of this magnitude can be measured with current measurement technology. Also, between now and 2010, the motor vehicle control program will continue to reduce both primary PM<sub>10</sub> emissions and gaseous PM<sub>10</sub> precursors. EPA's PM models do not account for all of the physical and chemical processes that are known to affect PM<sub>10</sub> concentrations. Any PM model used should take account of the secondary formation of particulate matter from NO<sub>x</sub> and SO<sub>x</sub> and the chemical interactions between the various secondary products. EPA should reveal how the PM models it is using to support the Tier 2 analysis compare with the models that EPA had been developing for use in PM<sub>2.5</sub> SIPs. EPA's projections of future PM<sub>10</sub> concentrations are unreliable and EPA's inventory models cannot reproduce the major improvement in PM<sub>10</sub> that has occurred over the past decade. Until EPA develops and discloses reliable models and databases, it cannot lawfully rely on projected PM<sub>10</sub> reductions as a justification for additional Tier 2 controls. In addition, EPA's proposed Tier 2 standards are not necessary to attain or maintain the PM NAAQS. EPA has overstated the benefits for PM reduction of its Tier 2 proposal. Because the RIA determined that the maximum benefit of the proposal would not occur until the fleet is fully turned over, the PM benefit calculated by EPA would not actually materialize until 2040. The small amount of benefit that may be achieved are geographically concentrated in the east. GM cites to the Abt Associates Technical Support Documents (Exhibits A-8 & A-10), dated 1999. **(General Motors Corporation (IV-D-209), vol. 2, p. 53-54, Alliance of Automobile Manufacturers (IV-D-115), p. 33)**

**RESPONSE:** These comments appear to be addressing aspects of the PM projections regarding future PM<sub>10</sub> nonattainment, and also aspects of the projections of PM<sub>10</sub> and PM<sub>2.5</sub> reductions used to determine the benefits of the Tier 2/Gasoline Sulfur program. These should be kept clearly separated. EPA is not using the benefits analysis as the legal basis for adopting the program, so alleged faults in that analysis do not necessarily call into question the legal basis for the program. PM<sub>10</sub> issues are also discussed in the response to Issue 27.4(A)(1).

#### PM<sub>10</sub> Nonattainment

The final preamble and RIA lay out the basis for our determination that further emission reductions are needed in order to attain and maintain the PM<sub>10</sub> NAAQS. For the vehicle standards for VOC and NO<sub>x</sub> and for the limits on sulfur in gasoline, PM<sub>10</sub> considerations are additional support for standards that are fully justifiable on ozone considerations alone. The comments regarding our PM<sub>10</sub> analysis are therefore only material with respect to the vehicle PM standards.

The Climatological Regional Dispersion Model Source-Receptor Matrix Model used to make predictions of future PM<sub>10</sub> nonattainment does account for chemical processes, although not with as much sophistication and detail as the model (MODELS3) that is under development for eventual use by states in preparing attainment demonstrations under a PM<sub>2.5</sub> NAAQS. In addition, the model is calibrated to historical PM monitoring data. By limiting our conclusions about future nonattainment to only areas that currently have monitoring data indicating PM<sub>10</sub> NAAQS violations, we believe we are not over predicting the extent of future nonattainment.



### PM<sub>10</sub> Reductions

Whether the PM<sub>10</sub> and PM<sub>2.5</sub> reductions predicted by our modeling are large enough to be detectable with current monitoring methods is not relevant to whether they will actually occur or have economic value.

In our final RIA, we have accounted for the actual amount of fleet turnover that will happen by 2030. This is slightly less than full turnover to the most stringent final standards, since in EPA's emissions models full turnover takes 25 years.

**COMMENT P:** EPA should have conducted a sensitivity analysis of the modeling data to determine the extent to which small changes in the modeling impact the benefit/cost analysis. **(American Petroleum Institute (IV-D-114), p. 35)**

**RESPONSE:** The commenter suggests a sensitivity analysis of "small changes in modeling", but does not provide specific issues to consider in such an analysis. We are basing the rule not on the benefits analysis, but on our determinations under the statutory provisions. Because EPA's benefit analysis uses the relative changes in air quality as inputs to the benefit model (rather than absolute levels), small changes in the air quality model are not likely to have large impacts on the "relative" changes in air quality concentrations. We therefore are confident that small changes in input assumptions or method would not cause the basic conclusion of the cost-benefits analysis – that the action has net benefits well above its costs – to change. The running of the multiple models used to derive the total benefits estimate is time and resource intensive.

**COMMENT Q:** In the SNPR, EPA switched to a different modeling system and points to "preliminary analysis" that should be made available to allow for public comment. **(Subcommittee on Clean Air, Wetlands, Private Property, & Nuclear Safety (IV-D-256), Inhofe Questions, p. 1)**

**RESPONSE:** EPA did not switch to a different modeling system. We used exactly the same modeling it did in the NPRM. That modeling is thoroughly documented in the docket. The SNPR only added an additional method of analyzing the prior modeling output. As stated in the SNPR, "EPA is providing a more thorough presentation of the available ozone modeling data on the need for additional emission reductions to meet the 1-hour ozone standard, to provide additional information for public comment." The additional method, called the "exceedance method," was documented in the SNPR and in the docket.

The SNPR referred to this round of modeling as "preliminary" because as stated in the notice itself we were planning on a second round of modeling in order to make improvements, largely in response to comments. The final modeling is documented in the final RIA and its technical support document on ozone modeling.

**COMMENT R:** EPA's estimates of the effectiveness and environmental impacts are based on new, unpublished models or unpublished modifications to existing models. EPA should not claim benefits from unpublished models. Commenter provides a list of instances in which EPA has relied on unpublished or modified models. **(Koch Petroleum Group, LP (IV-D-72), p. 46)**

**RESPONSE:** As a general matter, EPA is required to provide the public and interested

parties with the opportunity to review the factual record that forms the basis for its rulemaking actions. As a matter of law, we are not required to formally peer review all of the information we use in our rulemaking process. Nonetheless, we often do employ formal peer review as one element of our quality assurance process for technical or analytic work.

We have met our obligation to provide the public and interested parties with the opportunity to review the factual record that forms the technical basis for our decisions regarding the Tier 2/Sulfur standards. In our initial Tier 2/Sulfur proposal, we presented analyses based on emission inventory models, air quality models, and models of the economic impact of changes in air quality. For the most part, those models had been used and made available for public review prior to the Tier 2/Sulfur rule. Furthermore, most of the models we used, or the underlying technical analyses embodied in those models, have met the requirements of EPA's peer review policy.

More specifically, our demonstration of the air quality need for further controls on motor vehicle emissions was based on pre-existing models and emission inventory estimates. We relied on the emissions models, emissions estimates, and air modeling performed for the NO<sub>x</sub> SIP Call. These models and estimates have undergone repeated, extensive public review as a part of this process; some of the models, such as the UAM-V ozone model, have also been reviewed in the course of cooperative ozone research efforts such as the Ozone Transport Assessment Group.

Our analysis of the impact of the proposed Tier 2/Sulfur standards on air quality relied on the same photochemical grid models used in the NO<sub>x</sub> SIP Call and in our evaluation of the need for further motor vehicle emissions reductions. However, our estimates of the impact of our proposed standards on emissions were based on updated emissions models. Many of the changes incorporated in these updated models had been released for public review and comment as part of the development process for EPA's NONROAD and MOBILE6 models. The key elements of MOBILE6 that we used, including the basic emission rates, emission deterioration rates, and sulfur effects on LEVs, have been formally peer reviewed. Similarly, our models and analyses of toxics emissions and exposures have been formally peer reviewed. These updated models, their inputs, and their outputs were made publicly available as part of the technical record we assembled in support of our proposal and through the docket for this rule. These models were used to construct our analysis of the impact of our proposed standards on the emissions inventory, and they were also used to estimate the emission reductions that would occur if our proposed standards were implemented. These estimates of the emission reductions from our proposed standards were used to project changes in air quality resulting from the proposed standards and to calculate the economic benefits of the standards that would result from reduced emissions. It should be noted that the air quality and economic benefits models themselves were not changed for the Tier 2/Sulfur proposal.

In our proposal, we stated that we would update and improve our analyses for the final rule. We also received extensive comment on the analyses we presented in support of our proposed rule that warranted changes in our modeling assumptions and modeling inputs. In light of these significant changes, we issued a Notice of Provision of Supplemental Information and Request for Comment on October 27, 1999. In that notice, we specifically noted that we were updating our regional modeling methods, inputs, and outputs, and that we were putting this material in the docket. We requested comment on all aspects of this notice and its associated docketed information. This information included our modeling methods, inputs, and results used to develop our final Tier 2/Sulfur standards. In doing so, we have used the best information available. Changes, modifications, or adjustments to official EPA models used in prior EPA or state analyses have been placed in the docket and have been made available for public scrutiny. The public has been given a comment

period to examine and comment on the assumptions, data, and models that we used.

In summary, the air quality and economic benefit models we used have been peer reviewed, as have the key elements of the models and adjustment factors used to update our estimates of light-duty emissions. Given the information we have at the current time, we are confident in the validity of these models and adjustment factors, as well as those models and analyses that have not undergone formal external peer review. All of these models, analyses, and adjustment factors have also been made available for public review and comment. We have received extensive comments on these models and analyses, and we have incorporated many of the points raised during the public comment process in the models and analyses used to evaluate our final Tier 2/Sulfur program.

The following discussion is offered in response to the examples alleged by the commenter of the use of unpublished models.

1. Use of the draft NONROAD model: Our initial draft of the NONROAD model was released for public review and comment in 1997. The version of our draft NONROAD model used for the Tier 2/Sulfur proposal was released for public review and comment in April 1999. For the proposal, this model was used solely for our emissions inventory analysis and was not used to develop inputs for the air quality modeling. For the final rule, we used the NONROAD model to develop inputs for our emissions inventory, air quality, and benefit/cost analyses.
2. Use of MOBILE6 and PART6: These emission factor models are still under development. Some of the quantitative relationships expected to be used in these models were used in our analyses. However, the analysis of the need for further air quality improvements contained in our proposal did not rely on emission inventories constructed using these relationships; as discussed above, this analysis relied on inventories generated using MOBILE5b, which has been in widespread use for years (including use in SIPs). We did use some of the quantitative relationships expected to be used in MOBILE6 and PART6 in our Tier 2 emissions model, which was used to help construct our analysis of the emissions inventory impact of the Tier 2/Sulfur program (which, in turn, was used to evaluate the air quality and economic benefits of our proposed rule.) The incorporated relationships were released publicly as part of the documentation for our proposal.

We used these and other quantitative relationships that may be included in MOBILE6 and PART6 to help construct the emission inventories used in the inventory, air quality, and economic benefit analyses to support our final rule. These relationships were placed in the docket in support of our October 27, 1999 notice.

3. Evaporative emissions model: The commenter appears to have misunderstood our modeling approach for nonexhaust emissions. We did not construct a "MOBILE6" model of nonexhaust emissions. Instead, we used the existing MOBILE5b model to evaluate the impact of the proposed and final Tier 2/Sulfur standards on nonexhaust emissions. Given the structure of MOBILE5b, this evaluation required a minor programming change, which did not alter the fundamental nature of the MOBILE5b model.
4. Use of summer temperatures year-round: For the final rule, we used long-term monthly average temperatures to evaluate emissions in each month when constructing our annual emissions estimates and developing our benefit/cost analysis. Our analysis of the need for and impact of the Tier 2/Sulfur program in terms of ozone was based on episode-specific emissions and photochemical grid

modeling, for which we used the historical temperatures that occurred in the ozone episodes being modeled.

To put the emissions reductions of ozone precursors ( $\text{NO}_x$  and VOC) from the Tier 2/Sulfur program in perspective, we used annualized summer emissions, in keeping with long-standing practice. Because ozone is primarily a summertime problem, it is necessary to annualize the summertime emissions reductions of programs whose emissions reductions vary from season to season in order to compare them to the emissions reductions of programs whose emissions reductions are relatively stable from season to season. We used the long-term average July temperatures and temperature ranges to calculate summertime and annualized summertime emissions. It should be emphasized that these annualized emissions were used solely to analyze the significance of the ozone precursor reductions from the Tier 2/Sulfur program and to estimate the cost-effectiveness of the program. Annualized emissions were not used to analyze air quality or estimate the economic benefits of the program.

5. Exclusion of non-anthropogenic emissions: In presenting our analysis of emissions, we chose to present only the anthropogenic emissions, since essentially all efforts to attain and maintain the NAAQS are based on reducing anthropogenic emissions. This type of comparison is standard practice and is designed to focus attention on the controllable portion of the emissions inventory in a given area. However, it should be noted that for both our proposal and our final rule, we incorporated all emissions, including biogenic emissions, in the air quality modeling used to assess the need for the Tier 2/Sulfur standards, evaluate the impact of those standards on air quality, and assess the economic benefits associated with reduced (anthropogenic) emissions.
6. The benefit/cost analysis used emission estimates developed for the ozone and PM-10 NAAQS, which overestimate emissions: EPA noted in its proposal that the benefit/cost analysis relied on emission estimates developed for the ozone and PM NAAQS, and we committed to revise the emission estimates used in its final benefit/cost analysis. These revised emission estimates are included in the materials submitted to the docket in support of our October 27, 1999 notice. The commenter's concern that we did not include biogenic and natural sources in our benefit/cost analysis is in error; these emissions were included, although they were not projected to change as a result of the Tier 2/Sulfur program. The claim that the emissions used in the proposal's benefit/cost analysis were overestimated was not substantiated by the commenter; in fact, some of the changes between the proposal and the final rule increase emissions (e.g., the use of the draft NONROAD model, incorporation of heavy-duty diesel defeat device effects), while other changes reduce emissions.
7. Use of a draft, unconsolidated version of the Complex RFG Model (sic): The version of the Complex Model used by EPA for its analysis of the impact of the proposed Tier 2/Sulfur program on emissions of hazardous air pollutants is referred to as the Unconsolidated Complex Model. This model is not "draft," as characterized by the commenter. It produces the same results as the final Complex Model currently used in the RFG program, with one primary difference: the unconsolidated model contains separate equations for each vehicle technology group, while the final Complex Model has "consolidated" all tech group equations into a single equation. The unconsolidated Complex Model is given in the Regulatory Impact Analysis for the RFG final rule, Section IV.7, Tables IV-11 and IV-12 (for the exhaust VOC and  $\text{NO}_x$  models, respectively). This RIA is part of the RFG docket (A-92-12).

**COMMENT S:** OTAG modeling showed limited ppb ozone reductions based on various reduced sulfur levels, which indicates that very little adverse air quality impacts would occur if EPA redesigned the sulfur reduction timing and levels during the 2004-2007 timeframe. Commenter cites to various OTAG results to support this position. **(Sunoco, Inc. (IV-D-73), p. 8)**

**RESPONSE:** The OTAG modeling predated the studies showing that emissions from low-emission vehicles, including vehicles capable of meeting the NLEV and Tier 2 standards, are extremely sensitive to sulfur. The OTAG modeling did not evaluate the impact of sulfur levels on emissions from vehicles meeting the Tier 2 standards. Instead, it evaluated the effect of lower gasoline sulfur levels on emissions from 1990 technology vehicles. As described in our proposal and in our technical documentation, vehicles meeting Tier 1, NLEV, or Tier 2 emission standards exhibit greater sensitivity to gasoline sulfur levels than 1990 technology vehicles.

Delaying the introduction of low-sulfur gasoline for several years would cause several adverse environmental effects. First, it would increase emissions from all vehicles during those years; these increases are particularly large for LEVs. Second, it would increase emissions from LEVs exposed to higher-sulfur fuel in those early years of the program for the entire lifetime of those vehicles. As documented in Appendix B of the RIA, operation on higher sulfur fuel causes emissions from Tier 2 vehicles to increase substantially -- and much of that increase is permanent, even after the vehicles are switched to low-sulfur fuel.

**COMMENT T:** EPA should not use the OTAG modeling system and databases to demonstrate non-attainment with ambient air quality needs. The OTAG modeling system was developed to assess the relative benefits of regional emissions control strategies for reducing regional transport in ozone nonattainment areas and was never intended to be used for the development of control strategies for particular nonattainment areas. **(Midwest Ozone Group (IV-D-139))**

**RESPONSE:** As discussed elsewhere (see the response to Comment 27.4. B.1), EPA's final Tier 2/Gasoline Sulfur modeling was intended to assess the national need for, and national impact of, a national motor vehicle control measure and not to devise local strategies for individual nonattainment areas. The OTAG model, UAM-V, and the general OTAG model configuration (i.e., grid resolution) are appropriate for regional and larger scale assessments of controls on ozone concentrations. This system was used by OTAG to not only look at transport but also to evaluate and compare the impacts of regionwide control strategies on ozone concentrations. Moreover, with regard to the need for further reductions, the final Tier 2/Gasoline Sulfur modeling system was supplemented with evidence from state SIP revisions and (in the case of Dallas and Beaumont-Port Arthur) modeling being prepared for inclusion in future submissions.

**COMMENT U:** The projected ozone benefits are below the measurement accuracy of the data used to calibrate the model and thus EPA cannot justify the rule based on ozone under either section 202 or 211(c) of the Act. **(American Petroleum Institute (IV-D-114), p. 96-97, Marathon Ashland Petroleum LLC (IV-D-81), p. 32)**

**RESPONSE:** The net benefits of the Tier 2/Gasoline Sulfur rule, a 9 percent reduction in the number of exceedances by 2007 and a 32 percent reduction by 2030, are clearly significant in terms of attainment. Changes in ozone concentrations as large as 27 ppb were predicted, while monitoring data is recorded to the nearest 1 ppb.

The full comment from API cites the population weighted change in annual average ozone concentration, used to determine changes in health effects. It is not reasonable to compare this value to the accuracy limit of ozone monitors, since the annual average reflects many hours with very low ozone for which we predict no benefit from the Tier 2 program. In any case, the estimates of the economic benefits of the program are not relevant to its legal basis.

Like all modeling applications, uncertainties do exist in the inputs and resultant outputs but the base year evaluation (and further investigations in response to comments) did not expose any fundamental flaw in the modeling system and therefore the model results should be accepted for use. In any case, the legal basis for the standards hinges on the need for further reductions assuming that the program is not implemented and on relative cost-effectiveness, not on the predicted changes in ozone resulting from the program.

**COMMENT V:** Important lessons can be learned from OTAG's analysis of stringent low-sulfur fuels that go beyond Phase II RFG requirements. This analysis demonstrated that these fuels produce only tiny incremental ozone benefits -- and none at all in some cities. The OTAG modeling showed that fuel changes would not have a large impact on air quality. Based upon this analysis, low-sulfur fuels were not recommended by OTAG. **(American Petroleum Institute (IV-D-114), p. 23, National Petrochemical and Refiners Association (IV-D-118), p. 9-10)**

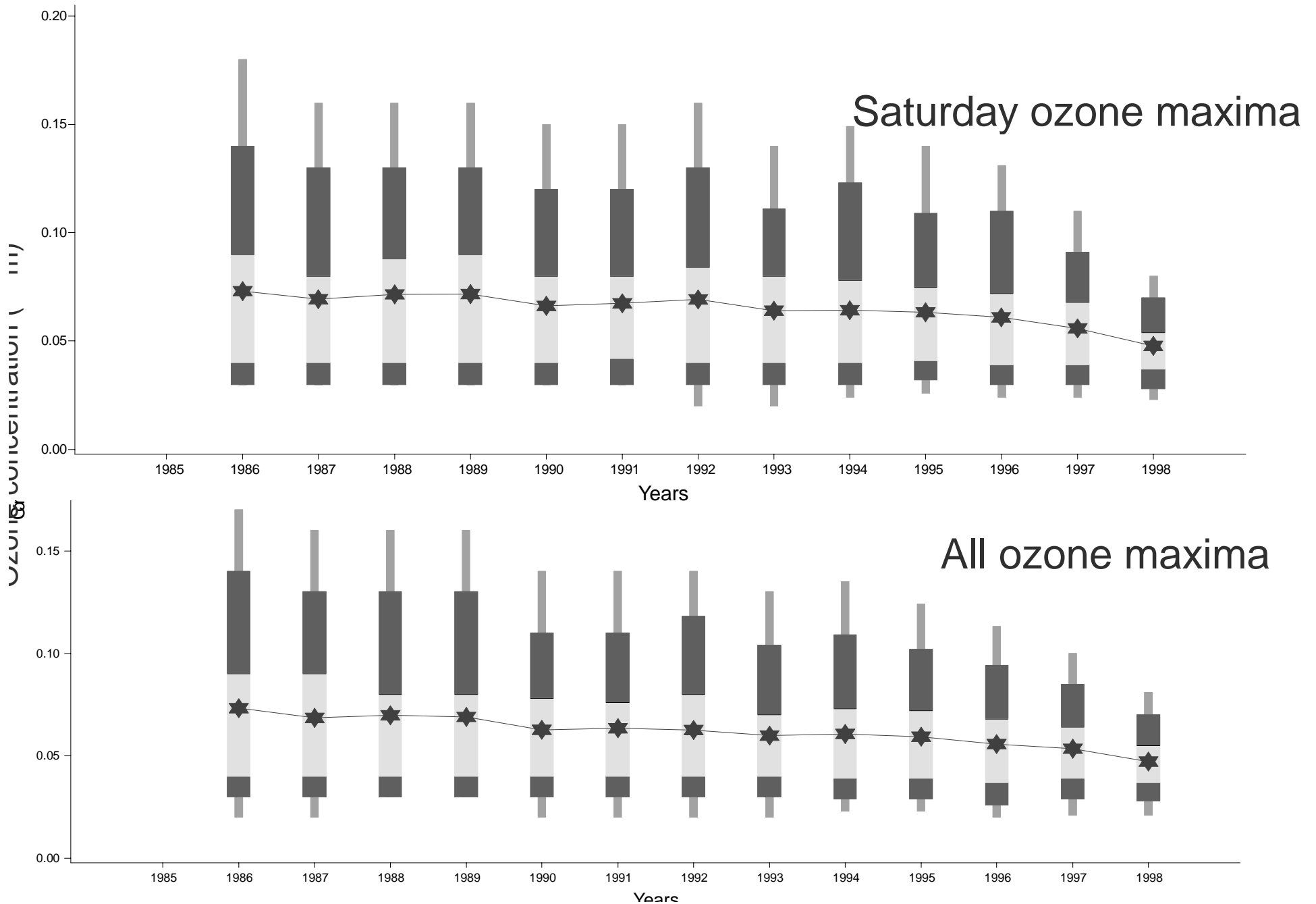
**RESPONSE:** EPA's final ozone modeling, considered along with information from local modeling efforts, indicates that there are 26 metropolitan areas which cannot be predicted to come into attainment under current emission control programs.

The issue of nationwide sulfur controls is addressed elsewhere in the preamble, final RIA, and this response to comments document.

At the time of the OTAG process, it was not understood how sensitive NLEV and cleaner cars are to high sulfur in gasoline. The ozone changes predicted by the modeling of the low sulfur scenario were small because the emission changes assumed were much smaller than EPA now estimates. The changes predicted by EPA's final modeling system are more accurate, and larger.

**Figure 1.**

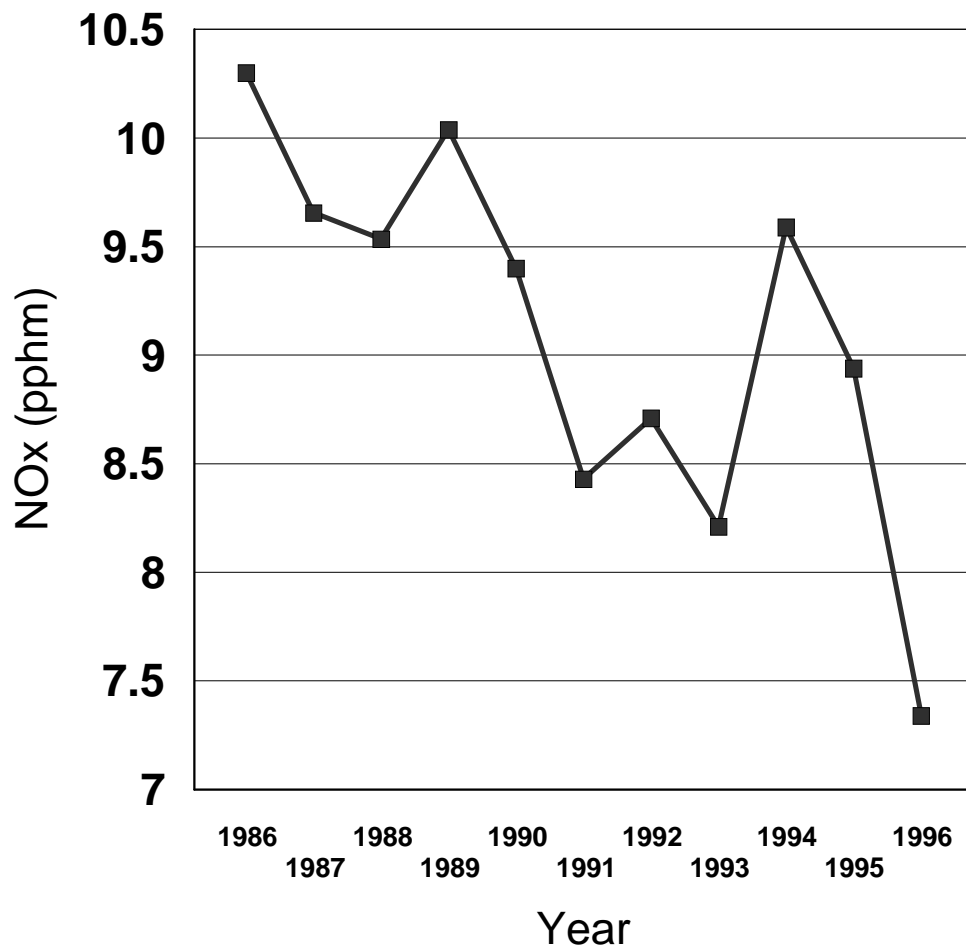
**Long-term trends in Ozone and Emissions: Reductions in ozone maxima for L.A. Basin occur during a period of reductions in NO<sub>x</sub> (and VOC) emissions**



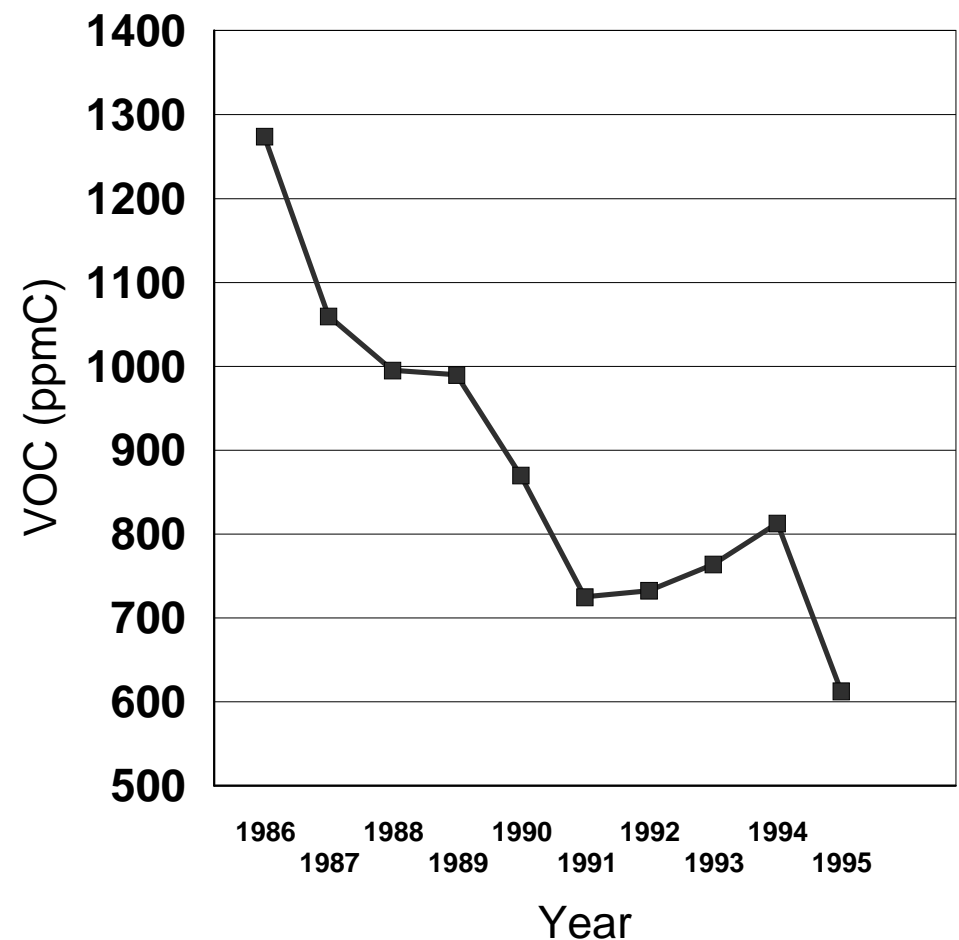
**Figure 2.**

**Ambient trends in LA basin suggest morning NO<sub>x</sub> and VOC (mobile related) emissions have decreased significantly over the period of declining ozone**

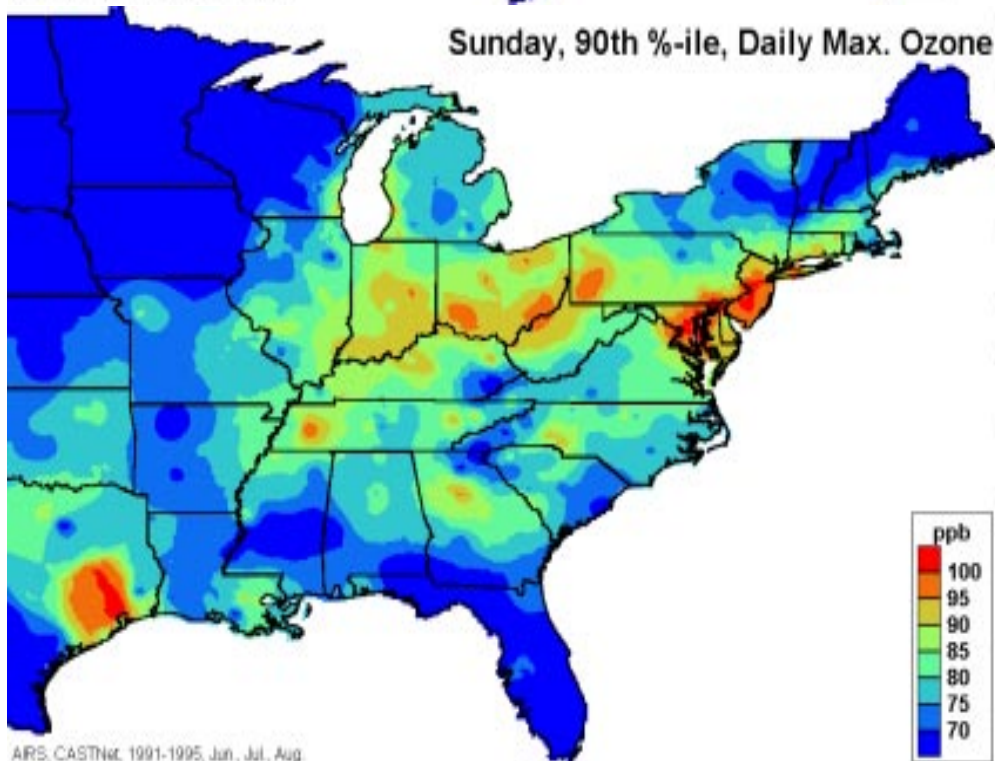
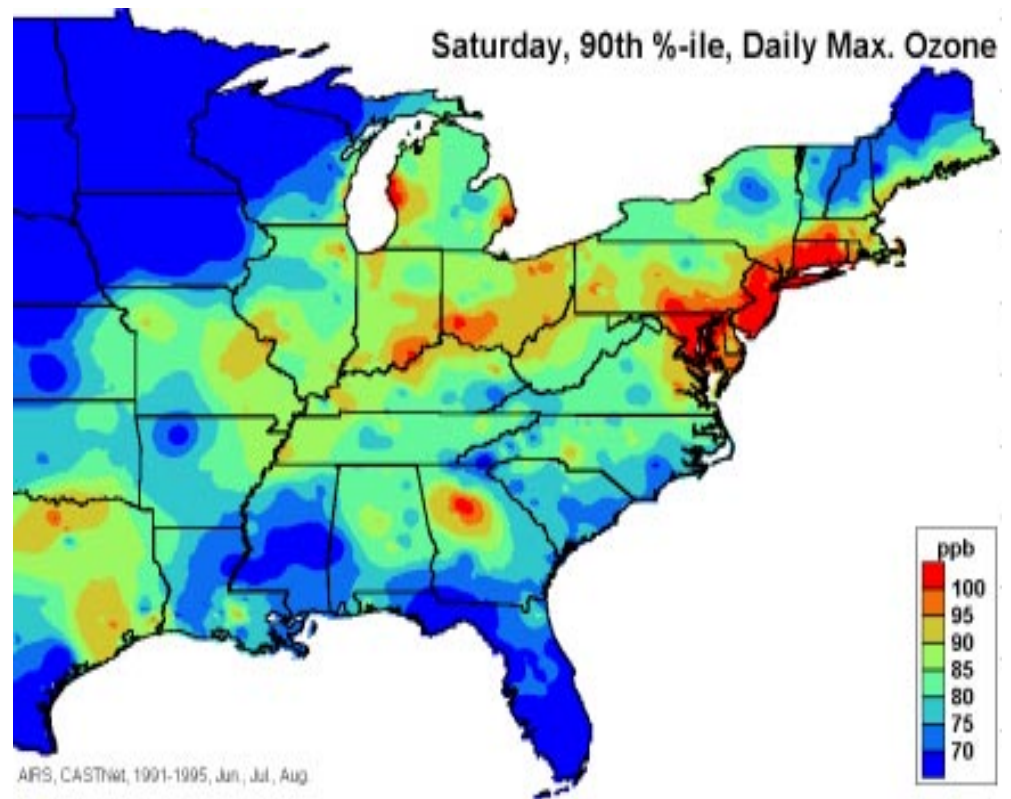
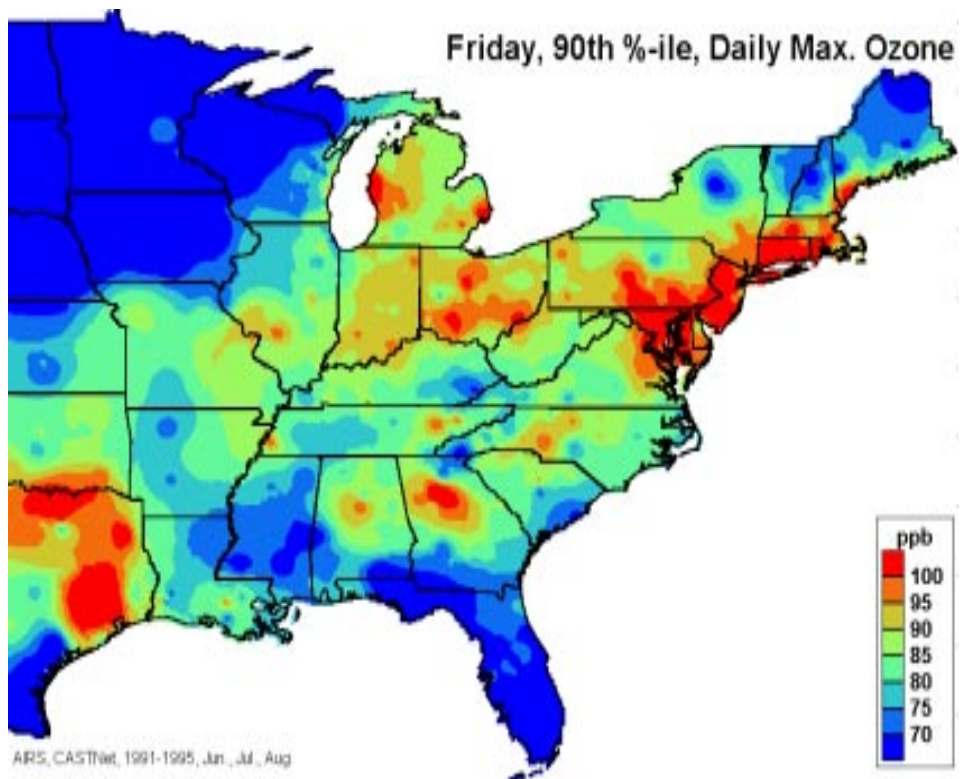
**Basin average am NO<sub>x</sub>**



**Basin average am NMHC**







**Figure 3.**  
**Findings of Regional Weekday/**  
**Weekend Effect in OTAG by Husar**

- Weekend ozone peaks significantly less on average than weekday for OTAG domain
- Weekend NO<sub>x</sub> and VOC emissions generally assumed to be less than weekdays
- Implies that NO<sub>x</sub> control has significant regional benefit, even if local benefits vary

## **ISSUE 28: TECHNICAL REVIEW OF VEHICLE STANDARDS**

### **Issue 28.1: Supports Technical Review**

**COMMENT A:** Supports an independent third-party feasibility study in 2004. (Alliance - to evaluate feasibility of more aggressive reductions in 2008) (**Alliance of Automobile Manufacturers (IV-F-76)**, **Alliance of Automobile Manufacturers (Atlanta) (IV-F-132)**, **Alliance of Automobile Manufacturers (Denver) (IV-F-133)**, **Alliance of Automobile Manufacturers (Cleveland) (IV-F-134)**, **Cummins Engine Company, Inc. (IV-D-132)**, p. 7-8, 17, **DaimlerChrysler (IV-D-59)**, p. 2, **DaimlerChrysler (Mobile Emissions) (IV-F-36)**, **DaimlerChrysler Corporation (IV-F-836)**, **DaimlerChrysler Corporation (Vehicle Emissions Planning) (IV-F-35)**, **Detroit Diesel Corporation (IV-D-52)**, p. 4-5, **Engine Manufacturers Association (IV-D-71)**, p. 25, **Ford Motor Company (Philadelphia - Day 1) (IV-F-131)**, **General Motors (Philadelphia - Day 1) (IV-F-131)**, **General Motors Corp. (IV-F-136)**, **National Automobile Dealers Association (IV-D-129)**, p. 2, **Navistar International Transportation Corp. (IV-D-50)**, p. 4, 23-24, **Ohio Coalition for Vehicle Choice (Cleveland) (IV-F-134)**) (See other letters listed under Comments A.1 and A.2 that follow.)

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT A.1:** A joint government/industry process should be used to select a panel of individuals with expertise in automotive engineering, environmental science, and economics. This panel would examine technical and commercial feasibility, including the impact of gasoline and diesel fuel quality on lean-burn and other advanced technologies, and the availability of reliable technology, precious metal catalysts, and necessary fuels within the time frame presented by the rule. The panel would also examine potential economic and competitive impacts and other policy considerations. AAM presents proposed regulatory language for this review process and recommends that EPA base this review on the rule as revised to be consistent with the Alliance proposal. (**Alliance of Automobile Manufacturers (IV-D-115)**, p. 5-9)

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT A.2:** EPA's proposal is based on the rapid development and deployment of advanced catalytic converter technology. The forecasted technology may have unacceptable interactions with sulfur. (**Association of International Automobile Manufacturers, Inc. (IV-D-123)**, p. 2)

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT B:** EPA should conduct an interim study before the rule takes effect to assess such issues as: improvements in catalyst design, the sensitivity of the catalysts to sulfur, future increases in precious metal availability and cost, development of lean-burn engines and lean-NO<sub>x</sub> storage catalysts, and/or the overall effect on competitiveness and vehicle cost. (**American Honda Motor Co. (IV-F-48)**, **Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131)**, **Cummins Engine Company (Atlanta) (IV-F-131)**, **Cummins Engine Company, Inc. (IV-F-32)**, **Engine Manufacturers Association (IV-F-118)**, **Engine Manufacturers Association (Atlanta) (IV-F-131)**, **Manufacturers of**

**Emission Controls Association (IV-D-64), p. 4, Navistar International Transportation Corporation (IV-F-12), Navistar International Transportation Corporation (Atlanta) (IV-F-131), Pennsylvania Coalition for Vehicle Choice (IV-F-46))**

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT C:** EPA should incorporate an independent midterm review of the proposed standards in the final rule. **(Engine Manufacturers Association (Denver) (IV-F-133))**

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT D:** Supports a technology review only if it does not provide industry with the incentive to prove that requirements cannot be met. **(Pennsylvania Dept. of Environmental Protection (IV-D-69), p. 3)**

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT E:** EPA should model the technology review after the technology review process for the 2004 on-road HDE standards. **(Manufacturers of Emission Controls Association (IV-D-64), p. 4)**

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT F:** Although a review for emission control technology feasibility seems unnecessary, supports a feasibility study of desulfurization to a 30 ppm level at roughly 1.5 cents/gallon, together with an independent review of the appropriate sulfur levels. **(American Petroleum Institute (IV-D-114), p. 152, Marathon Ashland Petroleum LLC (IV-D-81), p. 70)**

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT G:** Supports program only if an independent review shows that the price of emission reductions is cost-effective and affordable to customers. **(DaimlerChrysler (Mobile Emissions) (IV-F-36))**

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

#### **Issue 28.2: Opposes Technical Review**

**COMMENT A:** EPA should not include a technology review of the Tier 2 standards before the standards for HLDTs take effect. A formal technology review is unnecessary since there is sufficient lead time provided for compliance. **(American Lung Association (IV-D-167), p. 1, American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung**

**Association (Atlanta) (IV-F-131), American Lung Association (Atlanta) (IV-F-131), American Lung Association of Metropolitan Chicago, et. al. (IV-D-226), Clean Air Council (IV-F-28), Massachusetts Dept. of Environmental Protection (IV-D-137), p. 6, PA Public Interest Research Group (Philadelphia - Day 1) (IV-F-131), Physicians for Social Responsibility (IV-D-194), p. 4, Puget Sound Air Pollution Control Agency (IV-D-138), SC Coastal Conservation League (IV-D-260), SC Department of Health and Environmental Control (IV-D-56), p. 3, STAPPA/ALAPCO (IV-D-67), p. 6-7, STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Sierra Club (IV-F-14), Sierra Club (IV-F-3), Tennessee Environmental Council (Atlanta) (IV-F-132), U.S. Public Interest Research Group (Atlanta) (IV-F-132))**

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT B:** A 2004 technology review of the Tier 2 standards could be used to refine the program but should not be used as a means to delay implementation. **(American Lung Association (Philadelphia - Day 1) (IV-F-131), Maine Dept. of Environmental Protection (IV-D-177), NESCAUM (IV-D-130), p. 6)**

**RESPONSE:** See combined response to Issues 28.1 and 28.2 under summary of Issue 28.2, Comment C.

**COMMENT C:** Concerned that a formal technology review prior to the time standards for HLDTs take effect, could undercut the program. Given that EPA is always at liberty to relax an existing standard -- provided that the standard was not statutorily established, and these Tier 2 standards are not -- and that there is substantial lead time provided in this proposal, the notion of a formal technology review is inappropriate and unnecessary. In addition, by explicitly highlighting a specific technology review at a given timeframe, EPA will be inviting manufacturers to divert some of their efforts away from coming up with means to achieve the standards and to direct them toward showing why standards cannot be met. If EPA does provide a technology review, it must be performed by an independent third party and provide for a review of the feasibility of a more stringent standard. **(American Lung Association (IV-D-167), p. 5, International Center for Technology Assessment (IV-D-122), p. 7-8, SC Department of Health and Environmental Control (IV-D-56), p. 3, STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-D-67), p. 6-7, Union of Concerned Scientists (IV-F-88))**

**RESPONSE:**

As discussed in Section IV.A. of the preamble, we now have an even higher degree of certainty than we did at the time of the proposal that manufacturers will be able to meet the new Tier 2 program requirements with gasoline engines (and related emission control technology) in conjunction with gasoline averaging 30 ppm of sulfur. We do not plan to perform a formal technology review for the Tier 2 program. There is no need to specify any future procedures under these circumstances, given EPA's ongoing authority to revisit regulatory decisions where appropriate.

However, we are interested in monitoring the development of advanced technology propulsion and emission control systems that can meet the Tier 2 emission standards while advancing other national policy goals, such as improving fuel economy. The EPA staff will continue to assess the emission control potential of vehicles powered by technologies such as lean-burn and/or fuel-efficient technologies, including diesel engines equipped with

advanced aftertreatment systems, gasoline direct injection engines, and other technologies that show promise for meeting the Tier 2 standards in the post-2004 time frame and the role that low sulfur fuels play in enabling the introduction of these advanced technologies.

**ISSUE 29: ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS (SBREFA, APA, ETC.)**

**COMMENTS A and C:** Some commenters state that EPA has met its obligations under SBREFA. The process was thorough and beneficial, and panel members were willing to consider alternatives to address the needs of small refiners. However, other commenters argue that EPA has not met its obligations under SBREFA. EPA needs to reconsider its Initial RFA to account for the remanded ozone and PM NAAQS, both in terms of changes in impacts to small entities and whether there are other alternatives for mitigating impacts. **(Countrymark Cooperative, Inc. (IV-D-154), p. 1-2, Frontier Oil (Denver) (IV-F-133), Gary-Williams Energy Corp. (IV-D-74), p. 1-2, Gary-Williams Energy Corporation (IV-F-122), Marathon Ashland Petroleum LLC (IV-D-81), p. 26-27, Murphy Oil USA, Inc. (IV-D-117), p. 1, Sierra Club, Utah Chapter (IV-F-116))**

**RESPONSE:** We are not required by the CAA to provide special treatment to small businesses. However, the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) requires careful consideration of the economic impacts that rules will have on small entities. Specifically, the RFA requires rules subject to its provisions to determine, to the extent feasible, the rule's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain the ultimate choice of regulatory approach.

We have historically, as a matter of practice, considered the potential impacts of our regulations on small businesses. In addition, for this rulemaking, we convened a Small Business Advocacy Review Panel for our proposed rulemaking, as required under SBREFA. The final report of the Panel is available in the docket.

In addition to our participation in the SBREFA process, we conducted our own outreach, fact-finding, and analysis of the potential impacts of our regulations on small businesses. For today's action, we believe we have met the requirements of SBREFA. We have structured an interim compliance flexibility for small refiners to mitigate the hardship they could experience from our regulations while at the same time ensuring that the reductions needed in gasoline sulfur coincide with the introduction of Tier 2 vehicles. We have also provided small vehicle manufacturers with flexibility in meeting the Tier 2 vehicle requirements.

**COMMENT B:** Requests that EPA initiate a SBREFA panel process for the two dozen small refiners who may be impacted by the diesel regulations. **(Gary-Williams Energy Corp. (IV-D-74), p. 3, Gary-Williams Energy Corporation (IV-F-122))**

**RESPONSE:** We have initiated a SBREFA Panel process for small refiners who may be impacted by our soon-to-be proposed regulations on diesel fuel quality. This panel was convened on November 12, 1999 and will conclude with its final report (to be placed in the public docket upon signature of the rulemaking) in January 2000.

**COMMENT D:** Requests extension of the NPRM comment period. **(Alliance of Automobile Manufacturers (IV-D-171))**

**RESPONSE:** We believe we have provided considerable opportunity for comment on this rule. We had numerous meetings with the Alliance and other stakeholders during the development of our NPRM and received numerous written comments pertaining to the studies that proceeded this rule. We carefully reviewed industry comments on our Tier 2

Study and considered industry input as we developed the NPRM. Industry was aware of the nature of the provisions being considered for inclusion in the NPRM. We believe that time we provided for comment, almost three months from proposal and over one month after our notice of clarification, was adequate and we did not grant the Alliance's request to extend the comment period. We note that we did reopen the comment period on two occasions to address individual issues.

**COMMENT E:** EPA's "Clarification of Proposed Rule, Provision of Supplemental Information and Request for Comment" attempts to change the technical justification for the sulfur rule. **(See letters listed under Comments E.1 through E.4 that follow.)**

**RESPONSE:** See Responses listed under Comments E.1 through E.4.

**COMMENT E.1:** Instead of the extensive modeling and analysis that was prepared in the years leading to the proposal (and used as the basis of the Regional Ozone Transport Rule), EPA now points to "preliminary analysis," which is not yet available for public comment. This analysis was quickly prepared between the ruling in *ATA v. EPA* on May 14, 1999 and June 23, 1999, when the clarification rule was signed. API also notes that this staff analysis indicates that the "proposed Tier 2/sulfur program would reduce the number and severity of ozone exceedances in areas currently designated nonattainment under the existing 1-hour ozone standard." API is unable to comment on the accuracy of this statement because of the unavailability of adequate documentation. Another commenter argues that the failure to fully explain the differences between the rollback and exceedance methods is procedural error, especially given apparent discrepancies in the attainment results using the two methods (LA and Atlanta, for example). **(American Petroleum Institute (IV-D-114), p. 23-24, Marathon Ashland Petroleum LLC (IV-D-81), p. 26, Senate Committee Materials (IV-D-229), Sen. Inhofe, p. 5)**

**RESPONSE:** We disagree with this comment. The underlying data for the analysis that was conducted for our original Notice of Proposed Rulemaking was placed in the Air Docket in support of that notice. Documentation regarding the "preliminary analysis" the commenters mention was placed in the docket in support of our Supplemental Notice, and EPA provided adequate opportunity for parties to comment on that notice and its supporting documentation. The information presented in the supplemental notices was another way to interpret or summarize the ozone concentration predictions from the same ozone modeling presented in the original NPRM, which in turn was documented fully by information in the docket including detailed electronic files of those predicted concentrations. General Motors and the Alliance of Automobile Manufacturers commented thoroughly on this modeling, including the use of the exceedance method. We believe all the issues which could be raised have been, and have been addressed in our final round of modeling.

**COMMENT E.2:** At page III-43 et seq. of the RIA there is an extensive discussion of the "rollback method" of projecting design values into the future. EPA acknowledges that this modeling procedure was used in the Regional Ozone Transport Rule. EPA refers to another method -- "exceedance method" -- in the Clarification Notice. EPA states that this method projects that more areas will be nonattainment in 2007. API has reviewed the Agency's statements and a three-page memorandum in the docket. However, there does not appear to be any technical documentation or justification for the Agency's assertions. It is important to note, however, that the extensive modeling and analysis in the RIA does not support this assertion, nor does the additional supplemental information. It is difficult to understand why this analysis and the underlying modeling were not made available with adequate time for public comment and analysis. There appears to be no basis to reject the

modeling based upon the "rollback method," which was used as the basis for the fuels Staff Report, the RIA, and the Regional Ozone Transport Rule in favor of the undocumented results attributed to the "exceedance method" analysis in the Clarification Notice. **(American Petroleum Institute (IV-D-114), p. 24)**

**RESPONSE:** The application of a rollback method for 1-hour attainment determinations was examined by EPA in the process of the rulemaking on the NO<sub>x</sub> SIP Call, and rollback results were presented in the Tier 2 Study. However, EPA's guidance that states use an exceedance method for 1-hour ozone attainment modeling goes back to our 1996 guidance on 1-hour SIPs and even earlier. In the final action on the NO<sub>x</sub> SIP Call, EPA did not use rollback to determine which receptor areas would be in violation of the 1-hour ozone standard in 2007, and thus which upwind areas were contributing to nonattainment in another state. EPA used the exceedance method, in the same way as presented in the first supplemental notice. The modeling system used in the final Tier 2/Gasoline Sulfur modeling is an improvement over that used in the SIP Call rulemaking, and we have further relied on local modeling to conclude that some areas predicted by our exceedance method to be nonattainment in 2007 will in fact attain.

**COMMENT E.3:** The unavailability of the key documents and analysis violates the requirements in section 307(d) of the CAA, which requires the agency to include in the docket, "on the date of publication of the proposed rule," the factual data on which the proposed rule is based, the methodology used in obtaining and analyzing the data, and the major legal interpretations and policy considerations underlying the proposed rule. EPA is also attempting to short cut the notice and comment requirements of section 307(d) of the Act. Section 307(d) requires EPA to provide the public with an opportunity for oral comment on the proposal, and to accept written comments for 30 days after the public hearing. EPA provided no opportunity for oral testimony on the "supplemental" proposal. **(American Petroleum Institute (IV-D-114), p. 24)**

**RESPONSE:** EPA included all key documents and analyses on which we based the proposal in the docket on the date of publication of the proposed rule. We have subsequently added information to the docket as new information was provided to or produced by the Agency, as is appropriate under section 307(d)(4). We have also reopened the comment period on several occasions to allow outside parties to comment on new information. Our actions are fully in compliance with the procedural requirements of the Act.

**COMMENT E.4:** EPA published a clarification of the proposed standard to change the justification basis to the existing NAAQS standard. The revised justification now relies on "preliminary analysis" rather than the extensive modeling and analysis prepared in the years prior to the original proposal. The supplemental notice relies on analysis not yet available for public review and lacking supporting documentation. **(National Petrochemical and Refiners Association (IV-D-118), p. 2, 14)**

**RESPONSE:** We disagree with these comments. EPA has relied on the attainment and maintenance of the 1-hour ozone NAAQS and the preexisting PM<sub>10</sub> NAAQS, neither of which was at issue in the ATA case, for the air quality need discussion in the final rule. The justification for the Tier 2/Sulfur standards relies on the same "extensive modeling and analysis prepared in the years prior to the original proposal." The supplemental notice simply presents an alternative analysis of the modeling output. The analysis is fully described in the NPRM, the SNPR and in the Air Docket. The analysis was "preliminary" only in the sense that we intended to produce a better simulation and analysis based on public comment, including improved episode selection and more accurate emissions modeling. The emissions inventory and air quality modeling described in the preamble to



the final rule, the final Regulatory Impact Analysis, and the Air Docket is additional supporting documentation for EPA's analysis and has been available for public review.

**COMMENT F:** EPA has failed to provide interested parties due process of law. EPA has failed to provide an explanation of the bases for many of its proposals or sufficient details of those proposals such that industry may comment on them in a meaningful way (e.g., EPA's reference to including standards for vehicles over 8,500 lbs GVWR). The courts have recognized that "it is not consonant with the purpose of a rulemaking proceeding to promulgate rules on the basis of inadequate data, or on data that [to a] critical degree, is known only to the agency." *Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 375, 393 (D.C. Cir. 1973). See also, *Global Van Lines v. ICC*, 714 F.2d 1290 (5th Cir. 1983). **(Engine Manufacturers Association (IV-D-71), p. 31), Marathon Ashland Petroleum LLC (IV-D-81), p. 26)**

**RESPONSE:** We have explained the bases for the Tier 2/Sulfur proposal in the NPRM. The proposal has been thoroughly described and documented. Details of all modeling, have been made available in notices, the RIA, or the docket. Data used has been described in detail and is publically available. Hundreds of pages of industry and public comment have been based on detailed analysis of our data and modeling. The commenter provides no specific example of EPA failing to provide bases for its proposals, excluding the reference to vehicles above 8500 lbs. EPA provided further detailed discussion of that issue in its October 29, 1999 Federal Register notice (64 FR 58472). MAP's comment that EPA must wait the outcomes of "the numerous litigations now clouding the fuel regulatory universe" prior to promulgating this rule is a recipe for permanent Agency inaction, as all Agency actions are subject to possible review and revision based on future litigation. EPA must take action based on the facts in existence at the time a rule is completed. Thus, EPA has reviewed this rule in the context of the ATA decision.

**COMMENT G:** The proposed Tier 2 rule is arbitrary and capricious, an abuse of discretion, and otherwise not in accordance with applicable law. EPA has not articulated a rational nexus between the proposed actions to be taken, and the burdens, feasibility, cost and related factors that the Act requires EPA to consider. Commenter cites to applicable case law on this point. **(Engine Manufacturers Association (IV-D-71), p. 32)** The following deficiencies make the rule procedurally deficient: (a) factual incorrectness that sulfur causes irreversible damage to catalysts; (b) failure to consider disbenefits; (c) failure to consider diesel vehicle issues separately from gasoline vehicles; (d) failure to provide proper opportunity for comment after notice to account for the NAAQS court decision; and (e) failure to reconsider SBREFA analyses in light of the NAAQS court decision. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 24-27)**

**RESPONSE:** We disagree with this comment. The proposed Tier 2 rule has been carefully justified and described in hundreds of pages of public documents. As described in those documents, it strictly adheres to EPA's authority under the Clean Air Act and all other applicable laws. EPA provided almost three months for public comment between publication of the proposal and the end of the comment period. EPA also provided over one month of comment following the Notice of Clarification. EPA believes that this amount of time, in addition to the numerous public meetings and opportunities for members of the public to voice their concerns before, during and after the initial comment period and during the additional comment periods, have provided commenters with considerable opportunity to express their views and provide supporting documentation to EPA. Regarding the Regulatory Flexibility Act, the commenter does not discuss how EPA has not met the procedural requirements of the RFA. In any case, EPA has analyzed this rule in the context of the RFA in the preamble and Regulatory Impact Analysis for this rule. As

discussed in those documents, EPA has met the requirements for the RFA.

**COMMENT H:** Under the ATA decision, EPA has failed in this rulemaking to demonstrate any "determinate criteria" guiding its decisionmaking, and, in the absence of the 8-hour standard, has failed to articulate an "intelligible principle" supporting the conclusion that the proposal is necessary or appropriate. **(U.S. Chamber of Commerce (IV-D-142), p. 7)**

**RESPONSE:** EPA has promulgated its standards based on the specific requirements of the Act. We have reviewed the air quality need for further reductions, based on national air quality standards that are clearly in effect at this time, including the 1-hour ozone NAAQS. We have shown the feasibility of the standards and have provided detailed analysis of why this program is an appropriate program to reduce emissions, compared to alternative approaches.

**COMMENT I:** EPA violated Public Law 105-277 (requiring disclosure of data produced under a federal award) in not disclosing the underlying data for the Pope study. As a result of that violation and the importance of the Pope study to justify the benefits of the Tier 2 and gasoline sulfur proposal, the public has been denied an adequate opportunity to comment on the proposal. The comment period should be held open until the data are released and the public has an opportunity to evaluate and comment on the data. (Competitive Enterprise Institute email comment) **(Transcript of Emails Received (IV-D-236))**

**RESPONSE:** EPA has not used the underlying data from the Pope study to justify this rule. We used that study only for our cost-benefit analysis. EPA has never had the underlying data for the Pope study in its possession and did not rely on that data in its analysis. Thus, the availability of the underlying data would have had no effect on EPA's final decisions in this rule. Finally, the underlying data for Pope study was not federally funded and therefore not covered by the requirements of Public Law 105-277.

### ISSUE 30: RELATIONSHIP TO DIESEL FUEL ANPRM

**COMMENTS A, F, G, N, and S:** Supports reductions in sulfur for diesel fuel. (**Alliance of Automobile Manufacturers (IV-D-115), p. 13-18, American Lung Association of Michigan (IV-F-94), American Lung Association of Northern Ohio (IV-F-110), Bell, S. (IV-F-89), California Air Resources Board (IV-F-126), Detroit Diesel Corporation (IV-D-52), p. 3, Detroit Diesel Corporation (IV-F-92), Engine Manufacturers Association (IV-D-71), p. 6-7, Engine Manufacturers Association (IV-F-118), Manufacturers of Emission Controls Association (IV-F-39), Mavec, Ken (Cleveland) (IV-F-134), Ohio Lung Association (Cleveland) (IV-F-134), Oregon Department of Environmental Quality (IV-F-57), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), STAPPA/ALAPCO (IV-F-117), STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Sierra Club (IV-F-14), Sierra Club (IV-F-49), Sierra Club, Southwest Region (Denver) (IV-F-133), State of California Air Resources Board (IV-D-21), Union of Concerned Scientists (IV-F-88), Volkswagen of America, Inc. (IV-D-60), p. 2**) Navistar provides the following documentation (as attachments to their letter) to support their position that achieving low sulfur diesel in the near term is technologically feasible: "DOE Finds 'Niche Market' Ultra-Clean Diesel Fuel Economically Feasible," Diesel Fuel News, July 26, 1999; "'Premium Diesel' Task Force Agrees on Five Fuel Properties," Diesel Fuel News, Growing Your Business with Premium Diesel, (date unk.); "Technical Prowess, Flexibility Meet in Premium Diesel Sector," Diesel Fuel News, Growing Your Business with Premium Diesel, Kevin Adler and Jack Peckham (date unk.); and "Peroxide Cetane Improver Could Help Some Diesel Refiners," Diesel Fuel News, Growing Your Business with Premium Diesel, Jack Peckham, (date unk.). (**Navistar International Transportation Corp. (IV-D-50), p. 2-3, 7-18**)

One commenter noted that if the sulfur in diesel fuel is lowered to 30 ppm, light duty diesels will only be able to reach an emissions level of 0.3 g/mi. (**Volkswagen of America, Inc. (IV-F-54)**) Other commenters added that the current level of sulfur in diesel fuel is a barrier to the introduction of emission control technology for diesel engines, such as lean NO<sub>x</sub> catalysts, NO<sub>x</sub> adsorbers, and certain PM filter designs. (**Engine Manufacturers Association (IV-D-71), p. 10, Manufacturers of Emission Controls Association (IV-F-39)**) Another commenter stated that EPA must rollout its low-sulfur diesel program simultaneously with its Tier 2 schedule for diesel-powered vehicles (**National Automobile Dealers Association (IV-D-129), p. 3**), while another argued that the proposed Tier 2 standards for NO<sub>x</sub> and PM will be a significant challenge for light duty diesel vehicles. Such standards are not technically feasible with today's known state of emission control technology and diesel fuel quality. EPA should take the necessary actions to assure that a clean light duty diesel fuel is fully available to consumers in the 2005 timeframe. Without clear action by EPA on this fuel, refiners and vehicle manufacturers developing diesel engines will not have the certainty needed for planning and technology implementation. (**Engine Manufacturers Association (IV-D-71), p. 13**)

**RESPONSE:** As we explain in the preamble, one overarching principle of our vehicle program is the use of the same Tier 2 standards for all light vehicles and trucks, regardless of the fuel they are designed to use. As described in the preamble and in the RIA, we believe the standards are technologically feasible. Diesel engines used in LDVs and LDTs tend to be used in the same applications as their gasoline counterparts, and thus we believe they should meet the same standards. While their numbers in the fleet are currently very low, comments submitted to us and recent industry trends suggest that many more diesel engines could be used in light-duty applications at the time that the Tier 2 standards take effect. We believe that the interim standards are feasible for diesel engines using known technology and today's diesel fuel. However, the final Tier 2 NO<sub>x</sub> and PM standards will likely require applications of new types of aftertreatment for diesel vehicles

with, perhaps, changes in diesel fuel, as such devices are sensitive to diesel fuel quality, particularly sulfur content. Thus, we are preparing a notice of proposed rulemaking to limit diesel fuel sulfur levels. Our goal in that rulemaking is to have low sulfur diesel fuel available no later than 2007. If the comments to our proposal support our time line, low sulfur diesel fuel will be available in time to permit diesel engines to meet fully the Tier 2 standards.

**COMMENTS B - E, H - M, O - Q, and T:** EPA should adopt a 30 ppm sulfur standard for diesel by 2004 (for both onroad and nonroad diesel fuel) and should lower this standard further in 2007. **(STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Texas Fund for Energy and Environmental Education (IV-D-87))** Other commenters argued generally that the promulgation of a low-sulfur diesel fuel program should coincide with the national low-sulfur gasoline program (i.e., in 2004). **(Cummins Engine Company, Inc. (IV-D-132), p. 18, Detroit Diesel Corporation (IV-D-52), p. 3, Detroit Diesel Corporation (Atlanta) (IV-F-132), Engine Manufacturers Association (IV-D-71), p. 13-14, NC Dept. of Environment and Natural Resources (IV-D-262), Navistar International Transportation Corp. (IV-D-50), p. 2-3, 7-18, STAPPA/ALAPCO (IV-F-5), STAPPA/ALAPCO (IV-F-6), STAPPA/ALAPCO (IV-F-77), Tennessee Environmental Council (Atlanta) (IV-F-132), Texas Natural Resource Conservation Commission (IV-D-232), Tosco Corp. (IV-D-111), p. 8, Volkswagen of America, Inc. (IV-D-60), p. 2, Volkswagen of America, Inc. (IV-F-54))** However, another commenter argued that the promulgation of the national low-sulfur gasoline program should coincide with the low-diesel sulfur program (i.e., in 2008). **(Murphy Oil USA, Inc. (IV-D-117), P. 5)**

Many commenters argued that EPA should implement a sulfur standard of 5 ppm for diesel fuel. Even modest amounts of sulfur in the 20 to 30 ppm range inhibit the lean-burn catalyst technology under development. Near-zero sulfur fuel is necessary to fully achieve the environmental benefits of diesel engines. **(Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), Association of International Automobile Manufacturers (IV-D-123), p. 5, Cummins Engine Company (Atlanta) (IV-F-32), Cummins Engine Company, Inc. (IV-F-32), Detroit Diesel Corporation (Atlanta) (IV-F-132), Engine Manufacturers Association (IV-D-71), p. 6-11, Engine Manufacturers Association (IV-F-118), Engine Manufacturers Association (Atlanta) (IV-F-132), Navistar International Transportation Corporation (IV-F-12), Navistar International Transportation Corporation (Atlanta) (IV-F-132), Volkswagen of America, Inc. (IV-F-54))**

In more detailed comments, Navistar stated that EPA should mandate a 5 ppm sulfur diesel fuel requirement by 2004 that focuses on retail service stations (i.e. light duty fuel). A light-duty fuel approach would be cost-effective given that the current infrastructure at the refining, distribution and retail levels should be adequate to supply ultra-low sulfur fuel with little additional investment. A light-duty fuel approach would result in significant emissions reduction benefits beyond those anticipated under the Tier 2 program. The availability of a 5 ppm fuel would help encourage conversion of light-duty vehicles to diesel technology. Navistar provides significant discussion on the technical issues associated with the need for 5 ppm sulfur diesel fuel by 2004 as well as the feasibility and cost of mandating this low sulfur fuel for light-duty vehicles, and provides supporting data and documentation. Navistar cites to the following as supporting documentation: The Impact of Sulfur in Diesel Fuel on Catalyst Emission Control Technology, Manufacturers of Emission Controls Association (MECA), March 15, 1999 (MECA White Paper); API comments on EPA's ANPRM on Diesel Fuel Quality, July 13, 1999. Navistar also cites to statements from DOE and the Oak Ridge National Laboratory (ORNL) that support their position on this issue. **(Navistar International Transportation Corp. (IV-D-50), p. 2-3, 7-18)**

Navistar also noted that API and other refinery interests have raised questions concerning the need for and viability of a requirement for light-duty low sulfur fuel. However, these concerns cannot withstand careful scrutiny. If the light and heavy duty fuel markets are separated, the question of whether and when to establish light-duty diesel fuel sulfur limits at 5 ppm should be relatively non-controversial. Navistar provides significant discussion regarding the following issues and refutes some of the concerns or arguments that have been raised against implementation of an ultra-low sulfur fuel program (as stated/raised by API and other members of the petroleum industry): stranded investments, timing of the low sulfur requirement, fleet averaging, customer acceptance, technology needs, disruption to industry, alignment with HDE needs, and benefits of an ultra-low sulfur mandate. **(Navistar International Transportation Corp. (IV-D-50), p. 9-15)**

Refinery interests generally argued against a low-sulfur diesel requirement. Bringing the sulfur level to less than 10 ppm is feasible and cost-effective. However, these levels have been achieved by BP Amoco in England, which has a refining capacity based on hydrocrackers, whereas the refining capacity in the U.S. is based on FCC units. Contamination can happen very easily at this level. **(BP Amoco (IV-F-74))** The ANPRM suggests that stringent standards may be established for both on and off road diesel. Non-hydrotreated diesel is currently provided to farms - it is preferred since it causes less smoke and farm machinery damage than lower sulfur, treated diesel. To meet the new diesel standards, hydrotreating equipment will be required, which is estimated at an additional \$25 to \$30 million of capital costs plus substantially increased annual operating costs. **(Gary-Williams Energy Corporation (IV-F-41))** One commenter notes that it would not act to produce a light duty diesel until customer acceptance was demonstrated. Commenters also refer generally to ANPRM comments for further detail. **(American Petroleum Institute (IV-D-114), p. 151, Marathon Ashland Petroleum LLC (IV-D-81), p. 70, Sunoco, Inc. (IV-D-73), p. 22-27)**

Refinery and other interests also argued that sulfur reductions in diesel fuel should not be required at the same time as the implementation of the gasoline sulfur rule. There are not sufficient economies in constructing gasoline and diesel desulfurization equipment at the same time. Some of these commenters also argue that small refiners, in particular, will have difficulty in financing and undertaking simultaneous projects. **(Countrymark Cooperative, Inc. (IV-D-154), p. 3, Ergon, Inc. (IV-D-157), p. 9, Gary-Williams Energy Corp. (IV-D-74), p. 3, Gary-Williams Energy Corporation (IV-F-122), Gary-Williams Energy Corporation (IV-F-41), Giant Industries (IV-D-66), p. 2-3, Giant Industries, Inc. (IV-D-92), p. 3, Independent Fuel Terminal Operators Association (IV-D-158), p. 12-13, Valero Energy Corporation (IV-F-78))** The unique operating pressure differences of diesel versus gasoline desulfurization do not allow significant refinery offsite cost efficiencies of coincident project timing. Gasoline and diesel desulfurization designs will be unique and offer no significant design synergies. Commenter provides additional analysis and documentation consistent with its ANPRM comments. **(Sunoco, Inc. (IV-D-73), p. 22-27)** Also, requiring the highway diesel sulfur controls to be implemented in the same timeframe as the currently proposed gasoline desulfurization controls would place an impossible work load on refiners, contractors, technology vendors, and vessel manufacturers. API has already informed EPA that it requires an additional two years past EPA's 2004 target date for gasoline desulfurization and the additional requirements for desulfurization would add an additional two years to the time required to complete the gasoline desulfurization facilities. Thus, requiring both gasoline and diesel desulfurization to occur at the same time would probably not noticeably speed up the diesel timeframe but would substantially delay the gasoline desulfurization effort. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 14)**

Commenters also suggested specific ideas. One stated that if the rule on diesel sulfur advances, the timing of the highway diesel sulfur exemption should be synchronized with

the implementation of any new diesel sulfur requirements. **(Williams Energy Services (IV-F-114))** Others added that EPA should initiate a SBREFA panel process for small refiners who may be impacted by the diesel regulation (ANPRM) to address issues related to lead time and implementation schedule - particularly in the context of the gasoline sulfur program. **(Countrymark Cooperative, Inc. (IV-D-154), p. 4, Gary-Williams Energy Corp. (IV-D-74), p. 3, Gary-Williams Energy Corporation (IV-F-41))** Another commenter suggested that the same type of ABT program proposed for gasoline should be included in any future diesel rulemaking. **(Cenex Harvest States (IV-D-131), p. 3)**

On the issue of legal authority, Navistar argued that EPA has the authority to segment the light and heavy duty diesel fuel market. Oil industry commenters on the diesel fuel ANPRM have questioned EPA's legal authority under the CAA to mandate reductions in diesel fuel sulfur levels for use by LDVs/LDTs in 2004. EPA has ample legal authority to undertake such a rulemaking. Navistar provides significant discussion that supports the assertion that EPA has the authority to mandate reductions in sulfur levels. Navistar notes that CAA Section 211(c) establishes two criteria for mandating a low sulfur diesel fuel for light-duty vehicles and cites to Section 211(c)(1)(A) - Public Health or Welfare and 211(c)(1)(B) - Emission Control (and provides significant discussion and analysis in the context of these subsections). **(Navistar International Transportation Corp. (IV-D-50), p. 15-18)**

Diesel fuel quality issues should be selected in the context of appropriateness in meeting the performance and emissions control needs for heavy duty engines, since these engines consume more than 95% of the diesel fuel sold in the U.S. **(American Trucking Associations (IV-D-70), p. 3, 6)** Other commenters argued that, although simultaneous gasoline and diesel desulfurization should not be required, EPA should act to clarify the diesel desulfurization on a schedule that will allow refineries to plan their desulfurization projects for both fuels. **(Cenex Harvest States (IV-D-131), p. 2-3, Giant Industries, Inc. (IV-D-66), p. 2, Giant Industries (IV-D-92), p. 3, Louisiana Mid-Continent Oil and Gas Association (IV-D-68), p. 2-3, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 9-10)** This would allow for designing and optimizing required facility changes that may share common supporting facilities (such as hydrogen plants, amine treating and sulfur recovery units). In addition, the final diesel desulfurization level could influence sulfur reduction technology decisions (e.g., severe hydrotreating of the FCC feed versus adding hydrofinishing/hydrotreating units to the FCC gasoline and diesel streams). **(American Petroleum Institute (IV-D-114), p. 14)**

Finally one commenter stated that lowering the sulfur content in diesel is much more costly and difficult because of its inherently higher sulfur content and the operating conditions needed to accomplish desulfurization. Commenter estimates its costs at \$10-15 million. This cost will rise if nonconventional catalyst and treatment methods are required and if the standard to be met is an interim and not an ultimate standard. To assure cost-effective implementation, sulfur reduction for all grades of diesel fuel should be considered and implemented at the same time. **(Giant Industries, Inc. (IV-D-92), p. 2)**

**RESPONSE:** Since we have not yet made any formal proposals for diesel fuel sulfur control and are pursuing diesel fuel sulfur control under a separate rulemaking, we are not finalizing any diesel fuel sulfur requirements as part of the Tier 2/Gasoline Sulfur rule. We will consider all of the comments raised on this subject as we develop our upcoming proposal on diesel fuel standards, and will respond more fully to these comments, along with those submitted in response to the Diesel Fuel ANPRM, at that time. However, there were a few comments that relate directly to the Tier 2/Gasoline Sulfur rule which we will respond to here.

We have not concluded that diesel fuel sulfur control must coincide with the time that

gasoline sulfur control is implemented, although we support the concept that the refining industry needs as much advance lead time and notice of our intent to control diesel fuel sulfur as possible so that they may consider these controls while they plan to control gasoline sulfur levels. While some commenters asserted that they must or would prefer to control sulfur in both fuels with one technology, we believe that in most refineries different technologies will be used to control gasoline sulfur and diesel sulfur. (Note that Appendix D of the Gasoline Sulfur Staff Paper (May 1998) contains a very detailed write-up of the separateness, and slight amount of overlap, of gasoline and diesel desulfurization.) The only technology we're aware of that may be used to control both gasoline and diesel fuel sulfur levels is FCC feed hydrotreating, which is very expensive and has other drawbacks making it undesirable for many refiners. Elsewhere in their comments, API acknowledges that use of FCC feed hydrotreating is unlikely (outside of California) due to these drawbacks (see IV-D-114, p.21). While extremely low diesel fuel sulfur limits may make FCC feed hydrotreating more attractive, the levels that we are currently considering (and will present in our upcoming proposal) do not require this. Therefore, there is not a compelling technical argument to make the decision about diesel fuel sulfur prior to implementing the gasoline sulfur requirements. While, as the commenters note, there is some potential for refineries to design supporting facilities to meet the needs of both gasoline and diesel fuel desulfurization equipment, the lead time on designing and installing these types of facilities is not as great as that required for the actual desulfurization equipment. Our intentions on diesel fuel sulfur control will be made known in sufficient time for refiners to consider this as they make their design and construction plans.

Some refiners commented that they prefer to address diesel desulfurization after gasoline sulfur requirements are fully phased-in. Our upcoming proposal on diesel fuel standards will present additional information on this issue. When we finalize the diesel fuel requirements, our analyses will consider the implications of that action on the industry in light of the existing gasoline sulfur requirements, which will obviously precede any actions on diesel fuel.

**COMMENT R:** [Reserved] [See Issue 16.D]

### ISSUE 31: MTBE/RFG

**COMMENTS A - E:** EPA should express support for the use of oxygenates including MTBE, which will be necessary to replace the octane that will be reduced through the use of current desulfurization technologies (i.e. desulfurization of the products stream coming from the fluidized catalytic cracker unit). **(Valero Energy Corporation (IV-F-78))** Removing MTBE will not affect the ability of refiners to meet the sulfur standard. To the extent that refiners use MTBE to increase octane levels in premium gasoline, automakers contend that octane levels already are higher than they need to be to meet the needs of vehicles in the fleet. As for desulfurization losses, the new technologies that have become available (OCTGAIN 220 and CDTECH) have much better conversion rates than the older equipment and more product is retained during processing, thus lowering costs of desulfurization. **(Alliance of Automobile Manufacturers (IV-D-115), p. 141)**

However, others argued that EPA should not assume availability of MTBE in order to recover any octane lost as a consequence of desulfurization. At a minimum, a sensitivity should be identified. **(American Petroleum Institute (IV-D-114), p. 141, Marathon Ashland Petroleum LLC (IV-D-81), p. 39, National Petrochemical and Refiners Association (IV-D-118), p. 76-77)** Also, severe sulfur restrictions such as those contained in the proposed rule will greatly complicate refiners' attempts to adjust to any limitations on MTBE usage. **(National Petrochemical and Refiners Association (IV-D-118), p. 3, 24, 76-77)**

Finally, one commenter stated that the Tier 2/gasoline sulfur control program rules should be modified to include a prohibition on the increased use of MTBE in fuel formulated to meet the low sulfur requirements and should verify that there is no increased use of MTBE through record keeping requirements. **(City of Longview, et al. (IV-D-51))**

**RESPONSE:** In response to the concerns raised about MTBE in groundwater and the implications for the oxygenated gasoline and reformulated gasoline programs (which require the use of oxygenates such as MTBE), we commissioned a Blue Ribbon Panel on Oxygenate Use in December 1998. In a July 1999 report, the Panel made a number of recommendations for EPA action in response to the MTBE problems which fall under the following general categories:

1. Enhance water protection and monitoring
2. Prevent leaks through improvement of existing programs
3. Remediate existing contamination
4. Amend the Clean Air Act to remove the requirement that federal reformulated gas contain 2% oxygen (by weight)
5. Maintain current air benefits (no environmental backsliding)
6. Reduce the use of MTBE
7. Accelerate research on MTBE and its substitutes

It is important to realize that the Panel did not advocate a ban on MTBE use, but rather a reduction. MTBE was used in small volumes in gasoline for many years prior to the inception of the oxygenated gasoline and reformulated gasoline programs, and the Panel did not object to the use of MTBE in small quantities. We intend to address the Panel's recommendations to the extent possible within the Agency's current administrative authority. This will include strengthening underground storage tank programs and drinking water protection programs, and where possible, providing more flexibility to states and refiners as they move to decrease the use of MTBE in gasoline. We are also committed to working with Congress to provide a targeted legislative solution that maintains our air quality gains and allows for the reduction of MTBE, while preserving the important role of renewable fuels like ethanol.



When it comes to gasoline desulfurization, the available technologies vary in their impact on the octane value of gasoline. Some of the newest technologies, which are also lower in cost, appear to cause little-to-no reduction in octane, and at least one (a process by Black and Veatch) even increases octane. Thus, we believe that there are multiple options for refiners to desulfurize their gasoline without much of an impact on gasoline octane levels. Furthermore, refiners can choose among a list of other technologies which could make up for a loss in octane if the refiner chooses to use a desulfurization technology which causes octane loss. These technologies include alkylation, isomerization, and reforming. Another non-capital-intensive alternative to make up octane is to blend in high-octane oxygenates such as ethanol, ETBE, and TAME. Furthermore, one commenter points out that refiners market more high octane premium gasoline than necessary, and that a refiner could always choose to back down on producing premium gasoline instead of putting in additional octane-producing units. Refiners, in selecting the desulfurization technology that best fits within the configuration of a specific refinery, will have to consider the octane losses associated with each technology and the costs of various options for making up that octane loss, if there is a loss.

Our general conclusion, however, is that even with a reduction in the maximum levels of MTBE used in gasoline, refiners will have options for either preventing any octane loss or making up the octane loss. We believe that these strategies will not have a significant impact on the costs of desulfurizing gasoline.

**COMMENT F:** If the increased use of MTBE is not prohibited under Tier 2, EPA should conduct a full, multi-media assessment of the proposed rule (i.e. of the effects on air, soil and water of any potential increases in MTBE usage). **(City of Longview, et al. (IV-D-51))**

**RESPONSE:** As the previous response indicates, low sulfur gasoline may contain MTBE. However, given the range of technologies available to refiners both to desulfurize gasoline and to address any octane loss which desulfurization may bring, it is doubtful that use of MTBE in low sulfur gasoline would represent a significant increase in MTBE use in the U.S. Depending on the actions that EPA and the Congress take in response to the Panel's recommendations, total MTBE use may actually decrease. The amount of MTBE used in low sulfur gasoline is expected to be small and would not differ significantly from the volumes used in gasoline prior to the RFG program (or used now in some conventional gasoline). Hence, we disagree that a multi-media assessment of the type proposed by the comment is necessary in the context of this rulemaking. We believe that the ongoing work to assess the water, air, and soil impacts of MTBE - including those actions we will take in light of the Panel's recommendations, will provide us with important information about MTBE, and remain committed to assessing all gasoline programs in light of that information.

**COMMENT G:** EPA should ensure that the use of MTBE is banned since it causes serious adverse health effects. The use of MTBE (which increases emissions of formaldehyde, formic acid, and methanol and may produce methyl nitrite), is associated with various respiratory and neurological problems. **(Joseph, Peter M. (IV-F-24))**

**RESPONSE:** While we are continuing to study the health and welfare impacts of the use of MTBE, to date we have not been persuaded that the health effects are substantial enough to warrant a ban on MTBE. The Blue Ribbon Panel did not reach such a conclusion, either. We retain the authority, under CAA §211(c), to regulate any fuel or fuel additive that causes or contributes to emissions of air pollutants that can reasonably be anticipated to endanger public health or welfare. If we determine at a later date that the body of evidence argues for removal of MTBE from the gasoline supply, we will take appropriate action.

**COMMENTS H and I:** EPA should delay the low-sulfur gasoline rulemaking until both California and EPA finalize rules regarding use of MTBE and requirements for oxygen components in RFG. **(Koch Petroleum Group, LP (IV-D-72), p. 45)** MTBE, gasoline sulfur, and diesel sulfur should be addressed in sequence and not concurrently. The 1996 API/NPRA survey showed that 65 percent of U.S. gasoline production (excluding California) is from refineries which produce RFG and conventional gasoline. Most RFG is made using MTBE to meet the oxygen requirement. MTBE supplies volume and high octane directly or indirectly to 65 percent of U.S. gasoline. A phasedown or phaseout will have a tremendous impact on these facilities. EPA should allow time for the MTBE situation to clarify and work its way through the refining infrastructure. **(Sunoco, Inc. (IV-D-73), p. 2-3)**

**RESPONSE:** As we explain in the rule, we cannot promulgate Tier 2 emission standards without also requiring low sulfur gasoline. The air quality benefits of these combined programs are significant and the emission reductions are needed sooner rather than later to help states achieve their air quality goals. Hence, we cannot afford to delay action on gasoline sulfur until some of these other issues are resolved. At the same time, we will consider any future actions in light of our existing requirements, including gasoline sulfur, and will evaluate the impacts on the refining industry accordingly.

## ISSUE 32: ALTERNATIVE FUELS/TECHNOLOGIES

[Note: See also Issue 11(A).]

**COMMENTS A and B:** Supports EPA's continuing review of research on cleaner fuels and vehicle technology. One of these commenters urges EPA to develop an incentive program for advanced technology vehicles that have the potential to deliver environmental and energy-saving benefits. Other commenters suggest that EPA should consider establishing a program to promote advanced technology vehicles. ATVs are vehicles that do not rely on emission control systems to maintain low emissions. Examples include electric vehicles, fuel cell vehicles, and hybrid electric vehicles with ultra-clean internal combustion engines. **(American Public Health Association/Sierra Club (IV-D-86), National Conference of State Legislatures (IV-D-214), NESCAUM (IV-D-130), p. 5, Nissan North America, Inc. (IV-D-125), p. 2, 7, Ozone Transport Commission (IV-D-99))**

**RESPONSE:** The development of monetary incentives such as suggested by Nissan is beyond the scope of the Tier 2 rulemaking. NESCAUM suggests a program similar to California's Zero Emission Vehicle mandate that would require a fraction of a manufacturer's vehicles to have zero and near zero emissions. Such a program would involve numerous and complex issues as seen already in California. It would require a separate rulemaking process and could not be promulgated in this final rule. Nevertheless, we believe our Tier 2 rule provides incentive for advanced technology vehicles in that they can generate credits a manufacturer can use to offset other vehicles, to save for future needs, or to sell to other manufacturers. Note that our final rule contains special provisions, effective through the 2005 model year, that permit additional credits to be generated by vehicles certified to the lowest two bins. Also, EPA is heavily involved in developing advanced technology vehicles in the PNGV program—Partnership for a New Generation of Vehicles. Lastly, we note that our final rule includes provisions to provide additional credit to manufacturers certifying vehicles to the two lowest bins ( $\text{NO}_x = 0.0$  and  $0.02 \text{ g/mi}$ ). See Issue 11.A. and B. for details.

**COMMENT C:** One commenter provided significant comment and attachments related to the use of fuel additives for achieving the desired emission reductions. Specifically, the commenter provided information on the use of oxygenate plus an organic manganese compound. The commenter argues that this approach shows the capability to achieve emission reductions using existing catalytic technology and existing fuel sulfur levels. Commenter attaches various data and information related to this approach. The commenter recommends that EPA delay the Tier 2 rulemaking until complete tests can be conducted to determine the viability of this approach. The commenter also notes that the approach would be far less costly because the refinery modifications would not be required and the existing catalytic technology could continue to be used. **(National Alternative Fuels Association (IV-D-277))**

**RESPONSE:** We did not propose alternate means to getting the emissions reductions we identified in our proposal because of the clear connection we made between gasoline sulfur levels and catalyst performance. Our purpose in controlling gasoline sulfur is to enable and ensure the overall emissions performance of Tier 2 vehicles, not simply to get NOX emissions. We do not believe that the recommended approach would get the same emissions benefits as gasoline sulfur control because it would still allow the emissions performance of Tier 2 catalysts to be degraded by exposure to unreasonably high sulfur levels and because we are uncertain about the actual emissions reductions which would occur through the use of such an organic manganese compound. We will evaluate any data as it becomes available, but do not expect that any changes to the gasoline sulfur program would result from information provided about gasoline

additives.

### **ISSUE 33: DISTILLATION INDEX**

**COMMENT A:** EPA has underestimated the importance of controls on fuel volatility and does not adequately address the issue in the Tier 2 proposal. EPA should establish a nationwide cap on Distillation Index, which would have an extremely small impact on fuel prices while yielding significant reductions in hydrocarbon emissions. **(American Honda Motor Co. (IV-F-48))**

**RESPONSE:** The commenter did not provide data to support these statements beyond that which was included in the petition. Although the petition claimed that the effect of high DI fuels on driveability and emissions is more pronounced for advanced technology vehicles than for Tier 1 vehicles, we do not believe that DI control is necessary in order for light-duty vehicles and trucks to meet our Tier 2 standards. Unlike gasoline sulfur, DI control does not appear to be necessary to avoid significant impacts to emission control systems that are expected to be used on Tier 2 vehicles, based on the information available at this time. This is why we have decided not to set controls on DI in the context of our Tier 2/gasoline sulfur rulemaking, and have deferred a decision on a DI cap until further evaluations can be carried out.

We have not conducted our own analysis of the costs and benefits of DI control, but instead took comment on the analyses presented in the petition. According to that analysis, costs would be approximately 0.4 ¢/gal for capping DI at 1200. While it might appear that this cost is very small, it is not yet clear whether the costs, which have yet to be verified, would be appropriate for the amount of hydrocarbon emissions reduced. It will be necessary to conduct further evaluations before we could make a decision about whether to control DI, as described more fully below.

**COMMENT B:** EPA should cap the distillation index (DI) at 1200. **(National Automobile Dealers Association (IV-D-129), p. 3) (See other letters listed under Comments B.1 through B.3 that follow.)**

**RESPONSE:** The target DI level of 1200 was based primarily on studies correlating DI with driveability problems, commonly measured as Total Weighted Demerits (TWD). Some of these studies, though not all, show that DI levels higher than 1200 appear to dramatically increase the number of driveability problems experienced by drivers. As we continue to evaluate the DI petition in cooperation with stakeholders, we will consider the air quality and emissions control systems implications of controlling DI rather than incidences of driveability problems, and this evaluation will include a determination of the most appropriate level of DI control considering both emissions and cost. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

**COMMENT B.1:** The DI Petition as submitted in January 1999 by the automakers provides a substantial analysis and compelling rationale for controlling DI and contains more than enough information, when combined with the air quality need determined by EPA, to justify regulating DI at this time. EPA's hesitancy to address DI stands in sharp contrast to its discussion of the technological feasibility of the Tier 2 standards in the RIA. In Chapter IV of the RIA, four of the five strategies listed by EPA to reduce emissions (improving base engine design, A/F control, fuel atomization, and calibration) relate in some way to improving combustion efficiency and reducing HC emissions. The largest source of vehicle HC emissions occurs during cold start, and this is where controlling DI will help the most. Capping DI at 1200 will ensure that the fuel is volatile enough to vaporize properly inside the engine. AAM cites to and includes information from the Chrysler 1996 LEV-DI Study

and the 1998 AAMA Summer Fuel Survey. In addition, capping DI at 1200 would have little impact on the cost to the refining sector or to consumers. AAM refers to a recent study: MathPro, "Technical and Economic Implications of Controlling the Distillation Index of Gasoline," 10/21/98, as well as to "The Bloomberg Letter, 1995." It would be difficult to find a more cost-effective approach to controlling HC emissions than to cap DI at 1200. **(Alliance of Automobile Manufacturers (IV-D-115), p. 128-132)**

**RESPONSE:** The analyses presented in the DI petition are more thorough than any that have been conducted by the EPA to date. However, not only do the analyses in the petition raise several questions and issues, but it would be necessary to evaluate all the assumptions in those analyses before we could propose controls on DI. We intend to undertake that process of evaluation in cooperation with stakeholders following promulgation of the Tier 2/gasoline sulfur rule.

It may be true that capping DI at 1200 would help to control cold-start emissions through better fuel atomization and tighter calibrations. Thus changes in distillation properties such as DI will certainly have an impact on exhaust emissions. However, there does not appear to be a "break-through" DI level below which the Tier 2 standards are technologically feasible, and above which they are not. DI controls, like any fuel controls which reduce the variability of gasoline properties, may provide some additional flexibility to automakers seeking to design their vehicles to meet new emission standards. However, neither the petition filed by the automakers nor the comments submitted in response to the NPRM included information indicating that Tier 2 standards would not be feasible without DI controls, though some data was presented showing increased sensitivity (on a percentage basis) to DI for advanced technology vehicles. For these reasons we have determined that DI controls should not be a part of our Tier 2/gasoline sulfur rulemaking, but instead should be addressed subsequently.

See the response to comment 33.E.7 for further discussion of costs, and the response to comment 33.D for further discussion regarding cost-effectiveness.

**COMMENT B.2:** Volatility characteristics of gasoline have become critically important in order to meet more stringent emissions requirements. Exhaust emissions are increased by compromised engine calibrations and by actual operation on fuels with inadequate volatility. In support of capping DI at 1200, GM cites to the World Wide Fuel Charter, (published by the AAMA, European AMA, EMA, and Japanese AMA), dated 12/98 (provided as Attachment O to the GM letter); Jorgensen, S. and Benson, J., Simultaneous Measurement of Driveability and Emissions at Cool Ambient Temperatures, Society of Automotive Engineers 941870, dated 10/94 (provided as Attachment P to the GM letter); and Draft Technical Report - Emissions Benefits of a Proposed Nationwide Distillation Index (DI) Cap, Air Improvement Resource, Inc., dated 1/9/99 (provided as Attachment Q to the GM letter). **(General Motors Corporation (IV-D-209), vol. 2, p. 13-14)**

**RESPONSE:** The volatility characteristics of gasoline do have an impact on vehicle emissions, as evidenced by numerous emission studies including those conducted under the Auto/Oil Air Quality Improvement Research Program. In addition to the direct impact demonstrated in these studies, it also seems reasonable that the existence of high DI fuels in the field may force automakers to recalibrate their new vehicles in such a way that in-use hydrocarbon emissions are higher no matter what the DI of the fuel in the vehicle's tank happens to be. Automobile manufacturers posit that a DI cap would eliminate the need for this recalibration, producing an in-use emissions benefit that is in addition to the direct effect of DI control on the fleet. However, without further analysis, it is unclear to us whether this recalibration would produce an emissions benefit, lower costs for compliance, or both. As discussions with stakeholders on the topic of DI control proceed, we will be

requesting a more comprehensive analysis showing how a DI cap would impact the approach automakers take to vehicle certification.

The Jorgensen/Benson paper cited and numerous other studies have shown a clear relationship between emissions and driveability concerns such as hesitation and cold-starting problems. This study suggests a link between fuel volatility and emissions that would be an important element of any process of establishing any sort of cap on DI. However, there remains a need to evaluate the test conditions and results of these studies to determine the correct relationship between volatility and emissions for use in calculating the actual impact of DI control on inventories. For further discussion of the direct effect of fuel volatility on emissions, see response to comment 33.C.2.

**COMMENT B.3:** Toyota provides a presentation that summarizes why fuel volatility control is necessary in Tier 2. Toyota reviews the effects of poor fuel volatility on air/fuel ratio, torque, driveability, emissions, and acceleration enrichment as well as the effects of reducing fuel enrichment on emissions and driveability. EPA should cap DI at 1200, which is necessary for current vehicles and is called for in the DI petition and the World Wide Fuel Charter. A lower cap and narrower distribution of DI will be necessary for future vehicles complying with more stringent Tier II standards. In addition, EPA should investigate the necessity of a lower DI cap, for example 1150 for future Tier II vehicles. **(Toyota (IV-D-63), att.1 (all))**

**RESPONSE:** The information provided by Toyota shows both the observed effect of DI on emissions and the mechanism by which this effect may occur. This information was also useful in suggesting how the effect of DI on emissions for LEVs and ULEVs might differ from the effect seen for Tier 1 and earlier vehicles. The difference, it seems, is related to the more precise air/fuel ratio controls that may be needed in order to meet low emission standards. However, there was nothing in Toyota's comments to show that vehicles could not meet Tier 2 standards without a 1200 cap on DI. As described further in the response to comment 33.B.1, reductions in in-use DI levels would certainly allow manufacturers more flexibility in designing their vehicles (engines plus aftertreatment) to meet Tier 2 standards. But we have not seen illustrations of vehicles which are able to meet the Tier 2 standards with DI controls but will be unable, through other engine or aftertreatment adjustments, to meet those same Tier 2 standards without DI controls. This is why we are not setting a DI cap in this rulemaking, but instead will be addressing DI in more detail subsequent to promulgation of this rule.

**COMMENT C:** Supports petition of AIAM, DaimlerChrysler, Ford, and General Motors to control distillation properties of gasoline. EPA should implement controls for fuel volatility (i.e. driveability index), to help improve consistency between the Federal and California fuel standards. **(Association of International Automobile Manufacturers (IV-F-825)) (See other letter listed under Comment C.2 that follows.)**

**RESPONSE:** The current California regulations specify limits on the values of T50 and T90 which effectively cap DI at about 1200; proposed changes would explicitly include a DI cap of 1225. The current distillation property caps were set in association with caps on all other fuel properties when the Air Resources Board promulgated its specifications for Cleaner Burning Gasoline (CBG) in 1994. Due to the substantial air quality problems in California, the CBG program was implemented to produce dramatic reductions in emissions of VOC and NO<sub>x</sub> from the in-use fleet.

We do not think it is necessary to develop consistency between federal and Californian gasoline standards for each and every fuel parameter. While there are many similarities

between our fuel standards and California's, there are also some differences, based on differing air quality needs. In addition, for several years refiners have been able to produce gasoline to different specifications for the two regions, based on the different needs of those regions. Another commenter provided more detailed comment on this issue. That comment is summarized below.

**COMMENT C.2:** EPA should establish regulations to control the distillation properties of gasoline and, as soon as possible, address the problems associated with the distillation properties. Regulating these properties would provide significant additional reductions of hydrocarbon ozone precursor emissions, as well as greatly reduce toxic vehicle emissions. The cost of distillation control is estimated to be less than one-quarter of one cent per gallon of gasoline. **(Association of International Automobile Manufacturers, Inc. (IV-D-123), p. 4-5)**

**RESPONSE:** We agree that distillation properties can be correlated with vehicle emissions. However, the exact correlations between DI and emissions used in the petition from the automakers was the subject of some contention in the comments we received. It would seem that the available data is sufficient to establish this correlation for Tier 1 and earlier vehicles, though the statistical procedure should be agreed to by all stakeholders. The correlations developed by Air Improvement Resources, Inc. for LEVs, on the other hand, are based on data that we have not seen, and were derived from vehicles that were not SFTP compliant<sup>63</sup>. It is important that all stakeholders be involved in developing the emission correlations that are ultimately used in evaluating DI controls, and we need to analyze information on later technology vehicles before taking any action on DI. The true impact of DI on NO<sub>x</sub> has also been uncertain to date, and a nontrivial amount of data suggests that NO<sub>x</sub> emissions actually increase when hydrocarbon emissions decrease as a result of DI control. The impact on NO<sub>x</sub> must be resolved before the impact of DI control on ozone can be adequately determined.

**COMMENT D:** EPA should not impose distillation index caps, given its lack of justification based on air quality needs, peer-reviewed cost estimates, and cost effectiveness comparisons. **(Citgo Petroleum Corp. (IV-D-126), p. 4, Koch Petroleum Group, LP (IV-D-72), p. 45)**

**RESPONSE:** We agree that neither the petition nor EPA has yet provided a sufficient justification for controlling DI, based on the information and analyses currently available to us. However, as explained above, we are still considering the petition even though we have determined that DI controls do not represent a necessary step to enable light-duty vehicles to meet our Tier 2 standards. Our continuing evaluation of the need for DI control will certainly include a consideration of air quality needs, costs, and cost-effectiveness.

It does appear that there will continue to be nonattainment areas in the U.S. even after our Tier 2/gasoline sulfur program is implemented. However, it is not clear from the analyses presented in the automaker's petition whether DI control represents a reasonable next step in efforts to control ambient ozone. Despite the fact that DI control would reduce vehicle hydrocarbon emissions, the cost-effectiveness values presented in the petition are significantly higher than those for previous hydrocarbon control strategies. And as described in the response to comment 33.E.7 below, the cost estimates must be further

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<sup>63</sup> Heiken, Darlington, Kahlbaum, "Emission benefits of a proposed nationwide distillation (DI) cap," Air Improvement Resources, Inc., January 26, 1999.



analyzed by EPA, with stakeholder and public input, before they can be considered to be an accurate representation of what would occur if DI was capped at 1200. Thus further work must be done before we could conclude that DI controls are appropriate.

**COMMENT E:** Distillation index should remain controlled to 1250 maximum at the refinery level. The petition of the Association of International Automobile Manufacturers and others to reduce distillation index to 1200 should be denied. AIAM has not provided a cost/benefit analysis for reducing distillation index to 1200. The petition also incorrectly assumes that gasoline volatility is not controlled (ASTM specifications control DI to 1250 at the refinery level). The petition also incorrectly states that lower RVP increases DI; lower RVP increases T10 but not T50 or T90. Furthermore, a 1200 DI at the station level would require a DI of 1150 at the refinery gate, which reduces available summer gasoline by 60%. (**American Petroleum Institute (IV-D-114), p. 142-143, Marathon Ashland Petroleum LLC (IV-D-81) p. 44, 46-47, National Petrochemical and Refiners Association (IV-D-118), p. 82-83, Sunoco, Inc. (IV-D-73), p. 29**) (See letters listed under Comments E.2 through E.8 that follow.)

**RESPONSE:** Several commenters pointed out that the ASTM specification for gasoline (D-4814) was recently revised to include a DI cap of 1250. Since it is the highest DI fuels that create the most problems in terms of vehicle emissions and recalibrations, it would appear that this new specification would provide significant benefits to automakers and to the environment. However, since the ASTM cap is only enforceable at the refinery gate, it is unclear what effect it may have on retail level DI levels. Thus we feel it is important to evaluate the effect of this ASTM standard on in-use DI levels before regulatory DI controls could be established. This may require more than one year's worth of gasoline survey data, since refiners do not necessarily implement minor changes to ASTM D-4814 immediately after they are published.

The removal of the lightest components of the fuel to lower the RVP increases the concentration of heavier components, thus lowering the overall boiling point and increasing DI. Also, RVP can be correlated with T10, which is a factor in the DI equation. It does appear, then, that average DI levels can increase as the RVP of gasoline is reduced.

Finally, according to the analyses presented in the petition from the automakers, much of the reduction in DI that would occur if a cap of 1200 were established would be due to blending of the lowest DI fuel with the highest DI fuels. This approach would narrow the range of possible DI levels for in-use gasoline and lower the cost of complying with the DI cap, ensuring that summer gasoline volumes would not be dramatically affected. Of course, the validity of such an approach would need to be evaluated in cooperation with stakeholders, including the refiners. Other commenters provided more detailed comment on this issue. Their comments are summarized below.

**COMMENT E.2:** AIAM cites several emissions studies in its petition. However, most of these studies either did not have DI as a testing parameter or had several variables in addition to DI making it difficult to draw conclusions regarding the effect of DI on emissions. (**American Petroleum Institute (IV-D-114), p. 143, Marathon Ashland Petroleum LLC (IV-D-81), p. 46, National Petrochemical and Refiners Association (IV-D-118), p. 83-84, Sunoco, Inc. (IV-D-73), p. 29-30**)

**RESPONSE:** We do not believe it is crucial that the relationship between DI and emissions be based on only those test programs for which DI was a testing parameter. It may be sufficient, pending a review of the statistical procedures by all stakeholders, to use data on

RVP, T50, and T90, for instance, to estimate how DI would impact emissions.

However, it is important that DI (or other distillation properties) be varied as independently as possible from other fuel properties in the test programs on which the DI/emissions correlations are based. Confounding or colinear fuel properties may produce emission effects that are not limited to DI. Fortunately, a number of emissions studies, such as the Auto/Oil T50/T90 Study, did a reasonable job of varying distillation properties while keeping other fuel properties constant. The subject of test data and the effect of DI on emissions will be the subject of further discussions with stakeholders.

**COMMENT E.3:** Commenter also refutes petition request for minimum temperature for T50. Commenter believes that the tests were not performed at temperatures representative of class D and E winter fuels. At those temperatures, it is unlikely that lowering the T50 from 170 to 150 degrees F would have an impact on emissions. Also, DI variables for T10 and T50 are representative of the RVP of the fuel. The belief that increasing RVP lowers emissions is contrary to the Complex Model. Commenter provides further analysis of this concern, including how it would constrict octane blending options. **(American Petroleum Institute (IV-D-114), p. 145-146, Marathon Ashland Petroleum LLC (IV-D-81), p. 47-48, National Petrochemical and Refiners Association (IV-D-118), p. 84, Sunoco, Inc. (IV-D-73), p. 30)**

**RESPONSE:** The concern regarding T50 values that are too low is most often related to ethanol blends, since the use of ethanol in gasoline tends to depress T50 more so than MTBE. However, the Agency's definition of substantially-similar for gasoline does not apply to ethanol blends, and instances of T50 values for non-ethanol fuels falling below the sub-sim minimum of 170 °F appears to be very limited. Thus we agree that there does not appear to be any action necessary in the context of enforcing the sub-sim T50 minimum. The effects of low T50 values on emissions under cold temperature conditions also appears to be insufficient to justify formally regulating a new T50 minimum.

**COMMENT E.4:** The four rationales presented in the DI petition are not supportable. First, the difference between the current DI of 1250 and the requested DI of 1200 on emissions is insignificant. The rationale identifies engine misfires as the main indication of the problem, but the supporting data show no perceptible difference in misfires between 1200 and 1250 DI. Second, the engine calibrator can plan on having a maximum DI of 1250 to calibrate to, contrary to the assertion that the volatility is uncontrolled. Experience has shown that US manufacturers will not calibrate the engine to obtain additional emission reductions below the standard, but rather just enough to achieve the standard while maximizing performance. Third, is the issue of low T50s (see Item (3) above). Fourth, the auto industry argues that failure to control volatility compromises the benefits of tightened emission standards, but that argument is outdated given the ASTM volatility standards. Concerns about start-up and warmup problems will not be addressed by moving from a DI of 1250 to a DI of 1200. The testing data does not show statistically significant relationships to support this change, and some vehicles actually improved performance at increased DI levels. **(American Petroleum Institute (IV-D-114), p. 143-144, Marathon Ashland Petroleum LLC (IV-D-81), p. 45, National Petrochemical and Refiners Association (IV-D-118), p. 83-84)**

**RESPONSE:** The primary rebuttal for the need for a cap on DI is the recently adopted ASTM D-4814 specification of 1250 for ASTM Vapor Pressure Classes AA and A (essentially summer grade gasoline). However, it is not yet clear how this specification will affect in-use gasoline. As described in the response to comment 33.E.1, we will continue

to evaluate the impact of the ASTM cap on in-use DI levels.

It is not yet clear whether a DI cap of 1200 would have a significant impact on VOC inventories. The petition from the automakers shows that a DI cap would reach a maximum of 16 percent reduction in the VOC inventory for gasoline-powered vehicles and trucks in 2018. However, this value does not account for the impacts of our Tier 2/gasoline sulfur program, and the estimated impact on the inventory is highly dependent on the correlations between DI and emissions. We agree that the emissions benefits of recalibrations must be further evaluated, as described in the response to comment 33.B.2. Thus we believe that further analysis is required before a decision can be made regarding whether to control DI.

It should be clear that any controls on DI that we establish will be based on the emission benefits of those controls, not the improvements in driveability that may be associated with lower DI. Thus decreases in misfires or improvements in cold-startability, whether significant or not, will be incidental to any DI controls we set. Any regulatory controls on DI will be based on estimated emissions effects and cost-effectiveness.

**COMMENT E.5:** The auto companies fail to recognize the constraints on refiners' ability to reduce DI. Refiners must add components to achieve reduced DI, and the two most common additives, MBTE and Ethanol, are either about to be unavailable (MBTE) or rendered ineffective by the auto industry's addition of the ethanol oxygenate adjustment to the DI equation. **(American Petroleum Institute (IV-D-114), p. 144, Marathon Ashland Petroleum LLC (IV-D-81), p. 46, National Petrochemical and Refiners Association (IV-D-118), p. 84)**

**RESPONSE:** The mechanism through which refiners would lower DI under the auspices of a DI cap must be thoroughly reviewed with all stakeholders. Reblending of finished gasoline batches, as described in the petition and in the response to comment 33.E.1, is one way that much of the necessary reduction in pool-average DI might be achieved. It is true that the refinery modeling conducted by MathPro for the automaker's petition did not assume a phase-out of MTBE. Thus we intend to further evaluate this issue before making a decision regarding control of DI.

**COMMENT E.6:** Opposes the addition of an oxygenate adjustment factor to the DI equation because there is no study to document what the effects of various levels of MBTE or Ethanol on DI. **(American Petroleum Institute (IV-D-114), p. 144, Marathon Ashland Petroleum LLC (IV-D-81), p. 46)**

**RESPONSE:** It may be appropriate to add an oxygenate adjustment factor to the DI equation using available data. Since the original DI equation was based on incidences of driveability problems, the revised equation developed by Jorgensen et al<sup>64</sup> which includes terms for MTBE and ethanol may be valid. However, since the DI equation would be used to define the new specification for a DI cap, this issue must be examined very closely. First, any oxygenate terms must represent a combustion mechanism different than the suppression of T50 that normally accompanies oxygenate blending. Second, as pointed out in the petition, the equation for DI which was used in the petition includes an oxygen term that applies to ethanol, but no other oxygenate. The petition indicates that further

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<sup>64</sup> Jorgensen et al, "Evaluation of new volatility indices for modern fuels," SAE paper number 1999-01-1549.

work will be done to determine if other oxygenates have an effect on DI independent from dilution and suppression of T50. We feel it is important to finish this work before DI is correlated with emissions, and before a determination can be made that DI controls are warranted.

**COMMENT E.7:** The MathPro DI cost analysis is flawed and should not be used to document refiners' expected costs of lowering DI. The study should have used 1100-1150 as the appropriate DI to represent a 1200 per gallon limit. Also, the model inappropriately assumed that refiners would be able to rely on low cost volumes of MBTE to help meet the standards, which is inappropriate given current MBTE concerns. Also, the model was allowed to ship out heavy naptha and bring in light naptha at virtually no cost differential which is inappropriate when considering effects on refineries as a whole. **(American Petroleum Institute (IV-D-114), p. 145, Marathon Ashland Petroleum LLC (IV-D-81), p. 47, National Petrochemical and Refiners Association (IV-D-118), p. 84-85)**

**RESPONSE:** Commenters raised a variety of issues associated with the cost analysis conducted by MathPro for use in the automakers' petition. Thus before those costs could be used to evaluate the cost-effectiveness or the economic impact on the refining industry of a DI control program, we would like to see an exhaustive review of the MathPro study by the stakeholders. We would also like to have an alternative study for comparison, to ensure that the costs actually used in any DI control program are reasonable.

**COMMENT E.8:** Another concern is potential for infringement on the UNOCAL patents. Refiners may have to pay royalties to UNOCAL in order to produce gasoline with a DI of 1200 or less. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 47)**

**RESPONSE:** This is an issue which was not addressed in the petition from the automakers, and which we have not evaluated. Since it involves determining the mechanism whereby refiners would meet a DI cap of 1200, it is best addressed in the context of further discussions with stakeholders.

**COMMENT F:** Addresses generally the distillation index. Commenter provides ASTM balloting history on the distillation index to document that, contrary to auto manufacturer's statements, the ASTM consensus-based process was followed. **(ASTM, Committee D02 on Petroleum Products & Lubricants (IV-D-11))**

**RESPONSE:** The EPA has no formal involvement in the process of determining what changes can or should be made to ASTM D-4814. Although we understand the automaker's concern that voting within Subcommittee D02.A and the full Committee D02 has been unbalanced, such concerns will have little bearing on our ultimate decision about whether to place regulatory controls on DI. If we determine that DI control is needed, we would justify the control based on emissions benefits and cost, not solely on the existence of an ASTM specification for DI.

#### **ISSUE 34: NAAQS COURT CASE**

**COMMENTS A and B:** The recent U.S. Court of Appeals remand to EPA of the 8-hr ozone standard does not change the health problems associated with existing air pollution and vehicle emissions. The implementation of the Tier 2 standards is crucial for reducing vehicle emissions in order to mitigate the threat to public health. The D.C. Court decision to overturn EPA's ozone and PM NAAQS does not justify a delay or withdrawal of the Tier 2 rule. **(American Lung Association (Philadelphia - Day 1) (IV-F-131), American Lung Association of NY (Philadelphia - Day 1) (IV-F-131), Association of International Automobile Manufacturers (Philadelphia - Day 1) (IV-F-131), Environmental Defense Fund (Denver) (IV-F-133), Langon, John (Philadelphia - Day 2) (IV-F-131), National Conference of State Legislatures (IV-D-214), New Jersey Dept. of Environmental Protection (Philadelphia - Day 1) (IV-F-131), Ozone Transport Commission (IV-F-4), U.S. Public Interest Research Group (Atlanta) (IV-F-132), Union of Concerned Scientists (IV-D-195), p. 2)**

**RESPONSE:** We agree with this comment. The court did not generally challenge the scientific evidence on which the new NAAQS were based. That evidence clearly demonstrates health problems associated with ozone levels below the current 1-hour standard. In any case, we have based our analysis of need for the Tier 2 standards on the preexisting ozone and PM NAAQS. The analysis clearly indicates that Tier 2 standards are needed for attainment or maintenance of those NAAQS.

**COMMENT C:** The NAAQS decision (and/or the SIP Call stay) removes much of the underlying legal/policy justifications for the Tier 2 rule. **(Conoco, Inc. (IV-F-120), Engine Manufacturers Association (IV-D-71), p. 25-26, Franklin County (OH) (Cleveland) (IV-F-134), General Motors Corporation (IV-D-209), vol. 1, p. 17-18, Georgia Coalition for Vehicle Choice (IV-F-34), Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Murphy Oil USA, Inc. (IV-D-117), p. 3, National Petrochemical and Refiners Association (IV-F-19), National Petrochemical and Refiners Association (IV-D-118), p. 2,14, Ohio Coalition for Vehicle Choice (Cleveland) (IV-F-134), SD Dept. of Environment and Natural Resources (IV-D-218), State of Connecticut, Dept. of Environmental Protection (IV-F-2), Williams Energy Services (IV-F-114), World Satellite Network (IV-F-137))**

**RESPONSE:** We disagree with these comments. EPA has relied on the attainment and maintenance of the 1-hour ozone NAAQS and the preexisting PM<sub>10</sub> NAAQS, neither of which was at issue in the ATA case, for the air quality need discussion in the final rule. The justification for the Tier 2/Sulfur standards relies on the same "extensive modeling and analysis prepared in the years prior to the original proposal." The supplemental notice simply presents an alternative analysis of the modeling output. The analysis is fully described in the NPRM, the SNPR and in the Air Docket. The analysis was "preliminary" only in the sense that we intended to produce a better simulation and analysis based on public comment, including improved episode selection and more accurate emissions modeling. The emissions inventory and air quality modeling described in the preamble to the final rule, the final Regulatory Impact Analysis, and the Air Docket is additional supporting documentation for EPA's analysis and has been available for public review.

**COMMENT D:** The NAAQS decision bars EPA from employing the numbers used to justify the rule on a cost-benefit basis since the new ozone and fine particulate standards account for more than 85% of the benefits EPA attributes to the Tier 2 rule. **(Marathon Ashland (Philadelphia - Day 1) (IV-F-131))**

**RESPONSE:** We disagree with this comment on two levels. First, we have justified the

rule based on the need to achieve additional reductions in air pollution to enable attainment and maintenance of the existing 1-hour ozone NAAQS and PM<sub>10</sub> particulate NAAQS. The cost-benefit analysis simply presents the economic costs and benefits of the rule given the large adverse health effects associated with exposure to elevated levels of ozone and fine particulate matter. Our analysis shows that the Tier 2/Sulfur standards will result in much larger benefits than costs, but we do not rely on this finding to provide a legal basis for proceeding with the Tier 2/Sulfur standards. Second, we do not agree with the commenter's contention that the NAAQS decision bars EPA from considering the science on which the new ozone and fine particulate standards were based to analyze the benefits of this rule. The court decision neither ruled on nor proscribed EPA from using the scientific findings presented in support of the new NAAQS. As a result, we do not believe the court decision regarding the NAAQS adversely affects the validity of our cost-benefit analysis. The cost-benefit analysis simply determines the costs and benefits of the rule and is independent of the legal status of the new NAAQS.

**COMMENT E:** In light of recent court decisions EPA must withdraw the Tier 2 proposal, make revisions, and reissue the proposal. **(Marathon Ashland (Philadelphia - Day 1) (IV-F-131), Marathon Ashland Petroleum LLC (IV-D-81), p. 25-26)**

**RESPONSE:** EPA does not agree that it needs to withdraw the Tier 2 proposal. Though the recent ATA court case affected one of the issues that EPA reviewed in its proposal, the vast majority of the issues discussed in the proposal are unaffected by the court decision. Moreover, even with regard to the "air quality need" determination that EPA must make with respect to Tier 2 standards for LDVs and LDTs, the decision of the court does not invalidate the discussion in the notice of proposed rulemaking, which reviewed need under both the old and new ozone and PM NAAQSs. In any case, EPA specifically reviewed the "air quality need" issue in the context of the recent court decisions when it published its Clarification of Proposed Rule (64 FR 35112, June 30, 1999). EPA there explicitly found that the decision of the court did not change EPA's proposed determination that the Tier 2 program is a necessary and appropriate regulatory program. In the clarification and in this final rule, EPA limited its analysis to whether the proposed Tier 2 standards are justified based solely on the preexisting NAAQS and found that the proposed regulations are indeed still justified.

**COMMENTS F.1-3:** EPA has failed to adequately justify the proposed rule in relation to the 1-hour standard and should include this justification in the final rule, particularly since the recent court decision determined that the new 8-hour standard is unenforceable. One commenter states that EPA's clarification of the proposed rule did not adequately address the implications of the recent U.S. Circuit Court of Appeals decision to remand new standards for PM/Ozone. The June 30th clarification notice makes no mention of the potential NO<sub>x</sub> disbenefits from the Tier II/Sulfur rule and only includes the net benefits. Another commenter suggests it is clear that EPA's primary concern and justification for the stringent level and early implementation date for the sulfur requirements are the 1997-promulgated 8-hour ozone and PM<sub>2.5</sub> standards. It is inappropriate for EPA to attempt to implement measures to attain these standards in light of ATA v. EPA, and the fact that Congress expressly limited EPA's authority to implement these standards. It is important to note that EPA's modeling demonstrates that those areas that will be nonattainment after 2007 for the 1-hour ozone are not geographically dispersed. Nor are there any areas that will have a maintenance problem as defined by EPA (design value within 15 percent of standard). EPA's modeling also projects that even without these proposed control programs, both NO<sub>x</sub> and VOC emissions will continue to decline until approximately 2015. A third commenter states that nonattainment with the preexisting (.12 ppm) NAAQS is much less widespread and less significant than nonattainment with the

remanded (.08 ppm) NAAQS. Further, of the eight metropolitan and two rural areas cited by EPA in its supplemental notice of June 30, 1999, several are very close to being in attainment. Also, in the supplemental notice, EPA failed to make the necessary determination that reductions in precursors are necessary for attainment with the 1-hour standard, but rather states that "to the extent" reductions are needed, reductions from LDVs/LDTs in particular are needed. **(American Petroleum Institute (IV-D-114), p. 22-23, Engine Manufacturers Association (IV-D-71), p. 32, McIntosh, D. (IV-D-252), p. 7, Murphy Oil USA, Inc. (IV-D-117), p. 3, Regulatory Center, Mercatus Center, George Mason University (IV-D-265), p. 4-6, State of Connecticut, Dept. of Environmental Protection (IV-F-2)) (See other letters listed under Comments F.4 and F.5, below)**

**RESPONSE:** We disagree with both points related to the U.S. Circuit Court of Appeals decision. Our Tier 2/Sulfur standards are fully justified by the existing ozone and PM NAAQS. The June 30th clarification notice addressed the need for the Tier II standards in the context of the 1 hour ozone NAAQS and the preexisting PM<sub>10</sub> NAAQS. These NAAQS remain in effect and were not disturbed by the court decision. Any objection to the 1-hour NAAQS based on the UV-b disbenefits of ground level ozone reduction (which is what the commenter mainly addresses) should have been presented at the time that NAAQS was completed. Objections to the NAAQS are not relevant here. This is not a rulemaking to revise or reevaluate the NAAQS, but a rulemaking that determines, among other things, whether additional reductions in emissions are needed to attain or maintain the NAAQS. Regarding NO<sub>x</sub> ozone disbenefits, all of our analyses accounts for NO<sub>x</sub> disbenefits; we find that the benefits of Tier 2 are far larger than the disbenefits. The net benefits presented in our proposal and supplemental notice account for disbenefits, and the information contained in the Air Docket explicitly accounts for disbenefits.

We also disagree with all of the points regarding the justification for the sulfur standards and schedule. The need to proceed with these standards rests on our projections of continued widespread nonattainment with the ozone and PM NAAQS. In the case of ozone, the areas projected to be certain or highly likely to fail to attain or maintain 1-hour ozone NAAQS in the absence of today's rule have a combined 1996 population of 86.3 million and are found in 29 states (plus the District of Columbia) distributed throughout the country. An additional 12 areas, with a combined 1996 population of 25.3 million, have a moderate to significant risk of failing to attain or maintain the 1-hour ozone NAAQS in the absence of today's rule. Regarding PM standards, the NPRM did not rely on the PM<sub>2.5</sub> NAAQS in its determination of the need for the Tier 2/sulfur standards, though it did mention the benefits of this program. The NPRM, and later documents, rely on the NAAQS for PM<sub>10</sub>, in particular, the preexisting PM<sub>10</sub> NAAQS, in its air quality discussions. The projections of widespread nonattainment with the 8-hour ozone and PM<sub>2.5</sub> standards stayed by the court suggest that millions more people will continue to be exposed to unhealthy levels of ozone without today's rule, but the legal basis for today's rule does not depend on these projections.

While we agree that additional areas are likely to face attainment challenges with the 8-hour ozone NAAQS, we do not agree that the number of areas facing attainment challenges with the 1-hour ozone NAAQS is as small as the commenters claims. Our supplemental notice, and our analysis of our most recent ozone modeling results, shows that many more areas will not attain the 1-hour ozone NAAQS by 2007 than the commenters suggest.

**COMMENT F.4:** As part of this reevaluation, EPA needs to reevaluate whether the proposal is cost-effective compared to alternatives, such as a regional program targeting the one-hour nonattainment areas. **(Marathon Ashland Petroleum LLC (IV-D-81), p. 26)**

**RESPONSE:** See Responses to Comments 24.1(N), 24.1(S), and 13.

**COMMENT F.5:** The record is not clear, even with the Clarification Notice, that EPA has fully assessed the reductions that will be realized by current LDV/LDT emission standards, whether areas close to attainment will achieve attainment without Tier 2, and whether reductions from new programs such as Title V or Title III air toxics will reduce ozone precursors. EPA needs to assess the aggregate impact of these programs. **(U.S. Chamber of Commerce (IV-D-142), p. 3-4)**

**RESPONSE:** The commenter provides no data or analysis regarding its concerns. See Responses to Issue 27. See also Response 24.2(E)(2).

**COMMENT G:** EPA should consider how the recent NAAQS court case affects the proposed Tier 2 program. **(Colorado Petroleum Association (Denver) (IV-F-133))**

**RESPONSE:** See responses to Comments 34.E and 34.F, above. We have considered this comment and, as described above, have concluded that it does not alter our conclusion that it is appropriate under the CAA to proceed with the Tier 2/Sulfur standards, that the program will have enormous public health benefits, and that its economic benefits will far exceed its costs.



## **ISSUE 35: HEAVY DUTY VEHICLES**

**COMMENTS A, B, and C:** Commenters argue that EPA must address sulfur levels/emissions in heavy duty vehicles such as trucks and buses. Others state that EPA must address sulfur levels in diesel fuels used by heavy duty and off-road diesel engines. A state agency notes that in Texas, off-road diesel emissions of NO<sub>x</sub>, SO<sub>x</sub>, and PM make up an ever increasing percentage of the overall inventory. Reductions in off-road as well as on-road diesel fuel will allow sharing of on-road sulfur sensitive technology with off-road equipment and further reduce emissions in Texas. Other commenters state that EPA should publish a proposal addressing emissions from gasoline-fueled heavy duty engines and vehicles. Some of these commenters also state that EPA should adopt standards for vehicles up to 10,000 and 14,000 lbs GVWR. One commenter added that these heavy duty standards could be part of the Tier 2 rule or the ongoing HDE rule. (**American Lung Association (IV-D-167), p. 6-7, Appalachian Mountain Club (IV-D-251), California Air Resources Board (IV-F-126), International Center for Technology Assessment (IV-D-122), p. 4, Kauffman, W. (IV-D-212), Oregon Department of Environmental Quality (IV-F-57), Sierra Club, PA Chapter (IV-D-215), STAPPA/ALAPCO (IV-D-67), p. 8, Texas Natural Resource Conservation Commission (IV-D-232), Union of Concerned Scientists (IV-F-88), Union of Concerned Scientists (IV-D-195), p. 8**)

**RESPONSE:** We are very concerned about emissions from heavy-duty engines and vehicles (heavy trucks and buses) and have two rulemakings underway outside of the Tier 2 rulemaking process aimed at substantially reducing emissions from these vehicles in the future, and improving diesel fuel quality. On October 27, 1999 (64 FR 58472), we proposed standards and related provisions for 2004 and later model year heavy-duty engine and vehicles, including a chassis-based testing requirement for complete vehicles. We are also developing a proposal in which we are considering significantly more stringent standards for beyond 2004, and diesel fuel changes needed to support those standards. The proposed rules for 2004 and later model year heavy-duty vehicles is located on our web site at [www.epa.gov/omswww](http://www.epa.gov/omswww). The above comments are not directed at any proposals contained in the Tier 2 rulemaking and therefore do not have a bearing on the Tier 2 final rule.

**ISSUE 36: SMALL ENGINES**

**COMMENT A:** EPA must address sulfur levels in small engines. **(California Air Resources Board (IV-F-126))**

**RESPONSE:** To the extent that small engines operate on gasoline, the sulfur provisions of our final rule will address the sulfur levels of the fuels used by small engines. Gasoline bought for small engines is generally purchased through automotive filling stations and will therefore be subject to the provisions of this rule.

**COMMENT B:** EPA needs to set stringent emission standards for gas lawnmowers too. **(Kauffman, W. (IV-D-212))**

**RESPONSE:** EPA began regulating lawnmower engines and other small gasoline engines under 25 hp in 1997. In March of 1999 we finalized our Phase 2 regulations for many of these engines which will phase in stringent new standards between 2001 and 2007. Our web site EPA.GOV/OMS contains substantial information about our activities to reduce emissions from non road engines.

#### **ISSUE 37: CAFE STANDARDS**

**COMMENTS A - C:** Some commenters stated that even though EPA is closing the loophole for SUVs under the Tier 2 program, the light truck loophole remains open under the Corporate Average Fuel Economy (CAFE) program and should be addressed by EPA as well. Other commenters generally state that increased fuel efficiency should also be incorporated into the effort to reduce tailpipe emissions. [For some of these commenters, multiple individuals were docketed under a single docket number. In these cases, the total number of persons that voiced support for this position was approximately 200.] One coalition urged that President Clinton should veto any appropriations bill that attempts to freeze CAFE standards and EPA should act to increase CAFE standards to 42 mpg by 2010. **(Alliance for a Sustainable Future (Philadelphia - Day 2) (IV-F-131), Bell, S. (IV-F-89), Blackbrook Audubon Society (IV-F-104), Clean Cars Coalition (228 signers - partial list) (IV-D-246), Sierra Club (IV-F-3), Multiple Private Citizens (IV-D-2, 6, 7, 12, 15, 22, 33, 144, 145, 184, 248, and 267), Transcript of Emails Received (IV-D-36, 236, 239, and 240), Voicemail Transcript Reports (IV-D-235))**

**RESPONSE:** Corporate Average Fuel Economy (CAFE) standards are set by the U.S. Department of Transportation, not by EPA. Nonetheless, we are concerned about the fuel economy impacts of any of our motor vehicle rules. The Tier 2 rule will have no adverse effect on fuel economy.

#### **ISSUE 38: SUPPORTS/INCORPORATES OTHER COMMENTS**

**COMMENT A:** Supports the Alliance of Automobile Manufacturers (AAM) proposal. (American Corn Growers Association (IV-D-206), Clay, W. (IV-D-259), p. 1, DaimlerChrysler (IV-D-59), p. 1, 6, DaimlerChrysler (Mobile Emissions) (IV-F-36), DaimlerChrysler Corporation (Philadelphia - Day 2) (IV-F-131), DaimlerChrysler Corporation (Vehicle Emissions Planning) (IV-F-35), Detroit Diesel Corporation (Atlanta) (IV-F-132), Detroit Diesel Corporation (IV-F-92), Detroit Diesel Corporation (IV-F-96), Engine Manufacturers Association (IV-D-71), p. 17, Ford Motor Company (Philadelphia - Day 1) (IV-F-131), General Motors (Philadelphia - Day 1) (IV-F-131), General Motors Corp. (IV-F-136), Kildee, Dale E. (US Rep.) (IV-D-176), Michigan Congressional Delegation (IV-D-298), National Automobile Dealers Association (IV-D-129), p. 2, National Black Chamber of Commerce (IV-D-18), National Indian Business Association (IV-D-17), National Indian Business Association (Philadelphia - Day 2) (IV-F-131), Nissan North America, Inc. (IV-D-125), p. 4, Rangel, C. (IV-D-258), Volkswagen of America, Inc. (IV-D-60), p. 1, Volkswagen of America, Inc. (IV-F-54) Fine-grid modeling performed by ENVIRON in the northeast corridor indicates that there is no relevant difference between the effect of EPA's Tier 2 proposal and the Alliance proposal on ambient ozone concentrations. In addition, it is clear that the Alliance proposal will be much more cost-effective. Based on present-value calculations by AIR, Inc., the slightly adjusted compliance schedule will allow for a delay in the added emissions control costs. GM cites to: Assessment of the Effects of Tier 2 and Alternative Mobile Source Emissions Controls and Alternative Gasoline Sulfur Content on Ozone Concentrations Using Fine-Grid Modeling, Preliminary Draft Report, ENVIRON, dated 7/30/99 as supporting documentation. (General Motors Corporation (IV-D-209), vol. 1, p. 1, 3-4, 32-33; vol. 3, p. 10, 27-28)

**RESPONSE:** See responses under issues 24.2.E and 27.4.

**COMMENT B:** Supports the NPRA/API proposal and/or the API or NPRA comments. One commenter noted its support except as superseded in situations where the commenter's letter differs from the API/NPRA positions. (Citgo Petroleum Corp. (IV-D-126), p. 1, Citgo Petroleum Corporation (IV-F-33), Coastal Corporation (IV-D-159), p. 8, Colorado Petroleum Association (Denver) (IV-F-133), Conoco, Inc. (IV-D-124), p. 3, Conoco, Inc. (IV-F-120), Equiva Services LLC (IV-D-168), Ergon, Inc. (IV-D-157), p. 7, Flying J Inc. (IV-D-151), p. 1, Freeborn, J. L. (KS State Rep.) (IV-D-76), Louisiana Mid-Continent Oil and Gas Association (IV-D-68), p. 1, Marathon Ashland Petroleum LLC (IV-D-81), p. 1, National Petrochemical and Refiners Association (IV-F-19), Norco Refining Company (IV-F-20), Phillips Petroleum Company (IV-D-82), p. 3, Society of Independent Gasoline Marketers of America (IV-D-156), p. 4, 11, Society of Independent Gasoline Marketers of America (IV-F-61), Tesoro Northwest Company (IV-D-91), Ultramar Diamond Shamrock Corporation (IV-F-115)

**RESPONSE:** No response required.

**COMMENT C:** Supports STAPPA/ALAPCO testimony and comments. (Alabama Dept. of Environmental Management (IV-D-201), Connecticut Dept. of Environmental Protection (IV-D-65), Florida Department of Environmental Protection, Div. of Air Resource Management (IV-F-16), GA Dept. of Natural Resources, Environmental Protection Division (IV-D-57), Georgia Department of Natural Resources (IV-D-180), NC Dept. of Environment and Natural Resources (IV-D-262), Ohio Local Air Pollution Control Officials Association (IV-F-97), Puget Sound Air Pollution Control Agency (IV-D-138), Regional Air Pollution Control Agency (Dayton, OH) (IV-F-93), SC Department of Health and Environmental

**Control (IV-D-56), p. 4-5, Texas Natural Resource Conservation Commission (IV-D-232))**

**RESPONSE:** No response required.

**COMMENT D:** Supports Western Governors' efforts, including recommendations to be submitted by the Mobile Sources Forum of the Western Regional Air Partnership (instructed by Western Governors' Association). **(Chevron Products Company (IV-D-62), p. 7-8, att., National Petrochemical and Refiners Association (IV-D-118), p. 13-14, Western Governors' Association (IV-D-20))**

**RESPONSE:** No response required.

**COMMENT E:** Opposes the API proposal since it would unnecessarily delay the implementation of low-sulfur gasoline which is crucial for achieving cost-effective emission reductions. **(American Lung Association of South Dakota (IV-D-94), General Motors Corporation (IV-D-209), Spokane Tribal Natural Resources (IV-D-95))**

**RESPONSE:** See our responses under other issues. See especially Issue 13.

**COMMENT F:** Opposes the AAM proposal. **(American Lung Association of South Dakota (IV-D-94), Spokane Tribal Natural Resources (IV-D-95))** One commenter added that EPA should respond to the AAM proposal as follows: (1) Not allow any degradation from its proposed vehicle standard values and implementation dates. (2) If EPA grants a four-year delay to the automotive industry to "prove-out" technology, it must do the same for the refining industry. (3) Agree to eliminate the 50,000 mile standard. (4) Reject a separate (higher) fleet average for vehicles 6,001 to 8,500 GVWR and higher evaporative emissions standards. (5) Reject the zero sulfur fuel standard. (6) Accept a demonstration of feasibility of the capability to produce 30 ppm average sulfur gasoline at a cost of 1.5 cents per gallon over 340 ppm sulfur gasoline. (7) Accept an independent review of sulfur reduction feasibility during the next four years. **(American Petroleum Institute (IV-D-114), p. 149-152)**

**RESPONSE:** No response required.

**COMMENT G:** Supports all or parts of the EMA proposal. **(Cummins Engine Company, Inc. (IV-D-132), p. 3, Navistar International Transportation Corp. (IV-D-50), p. 3-4)**

**RESPONSE:** No response required.

## **ISSUE 39: Medium Duty Passenger Vehicles**

### **Issue 39.1: General Positions**

**COMMENT A:** Many commenters expressed support for EPA's proposal to include heavy-duty passenger vehicles up to 10,000 lbs GVWR in the Tier 2 program. Many of these commenters also provided general statements that it would be technologically and/or economically feasible for these vehicles to meet the Tier 2 standards, and/or that the reductions would assist states in achieving attainment. (**American Lung Association (IV-G-118), Clean Air Network (IV-G-106), Environmental Defense Fund (IV-G-107), Georgia Department of Natural Resources (IV-G-90), Illinois Environmental Protection Agency (IV-G-105), League of Women Voters (IV-G-91), Massachusetts Department of Environmental Protection (IV-G-94), Northeast States for Coordinated Air Use Management (IV-G-114), Ozone Transport Commission (IV-G-113), Sierra Club (IV-G-95), Sierra Club - PA Chapter (IV-G-93), South Carolina Department of Health and Environmental Control (IV-G-96), State and Territorial Air Pollution Program Administrators (STAPPA)/Association of Local Air Pollution Control Officials (ALAPCO) (IV-G-109), Wasatch Clean Air Coalition (IV-G-79), Wisconsin Department of Natural Resources (IV-G-135), Wisconsin Department of Transportation (IV-G-89)**) (Also see following comments from the public hearing held in Philadelphia, PA, November 2, 1999, Docket A-98-32, IV-F-01: STAPPA/ALAPCO, p. 23; Tsou, p. 34; Minott, p. 37; NRDC, p. 47; Breeze, p. 62; ALA, p. 66; Sierra Club, p. 89; Lopez, p. 111; MECA, p. 122; CARB, p. 132; NESCAUM, p. 138; CAN, p. 152; USPIRG, p. 159; Audubon, p. 209; NJPIRG, p. 232)

**RESPONSE:** We agree with these commenters that certain heavy-duty passenger vehicles (a category now referred to as "medium-duty passenger vehicles, or MDPVs) should be subject to the Tier 2 program light-duty standards, and we have finalized a program that is consistent with this objective while excluding appropriate vehicles and allowing appropriate implementation flexibilities. As noted in more detail later in this document and in the preamble to the final rule, the program that we have finalized is technologically feasible and cost-effective.

**COMMENT B:** Several commenters stated general opposition to EPA's proposal to include heavy-duty passenger vehicles up to 10,000 pounds GVWR in the Tier 2 program. (**Alliance of Automobile Manufacturers (IV-G-99), Ford (IV-G-82), Navistar (IV-G-111), Engine Manufacturers Association (IV-G-74), Detroit Diesel (IV-G-112), DaimlerChrysler (IV-G-117), National Automobile Dealers Association (IV-G-110), McIntosh, D., U.S. Rep. (IV-G-134), American Petroleum Institute (IV-G-85), GM/Isuzu Motors (IV-G-98)**)

**RESPONSE:** We disagree with these commenters. As stated in the preamble to the final rule, we continue to believe that medium-duty passenger vehicles, as defined in the final regulations, should be included in the Tier 2 program based partly on the type of use for which they are primarily designed, but also on GVWR, passenger capacity, and size of exterior cargo area (pick-up bed). As noted in more detail later in this document and in the preamble to the final rule, the program that we have finalized is technologically feasible and cost-effective.

### **Issue 39.2: Rulemaking Process/Notice & Comment Process**

**COMMENT A:** One commenter asserted that EPA should finalize this amendment with the heavy-duty highway engine and vehicles rule - not the Tier 2 rule, and that EPA's proposed definition should be viewed in conjunction with EPA's proposed heavy-duty standards.

**(American Petroleum Institute (IV-G-85))**

**RESPONSE:** As noted in the response for Comment B below, the possibility of applying Tier 2 light-duty standards to a segment of the heavy-duty vehicle category was raised in the Tier 2 NPRM in some detail, and in the recent notice proposing changes to the compliance program for heavy-duty highway engines and vehicles. We believe that it is entirely appropriate to finalize these provisions in the context of the Tier 2 rulemaking, as it addresses issues relevant to the Tier 2 rulemaking. In addition, the Clean Air Act lead time requirements that apply to heavy-duty vehicles would preclude the implementation of heavy-duty vehicle provisions concurrently with other Tier 2 requirements if we elected to finalize these outside of the Tier 2 rulemaking process.

**COMMENT B:** Some commenters generally noted that EPA has failed to provide stakeholders adequate notice and opportunity for comment. One commenter added that by attempting to re-define a segment of heavy duty engines and vehicles as light duty vehicles, EPA has failed to provide adequate notice by foreclosing any opportunity by interested parties to comment on that aspect of its proposal within the context of the Tier 2 rulemaking. Some of these commenters added that additional time is necessary to adequately perform revised cost/benefit analyses. Another commenter similarly noted that if EPA intends to include 8,501 - 10,000 lb GVWR heavy-duty passenger vehicles in the Tier 2 program, it must re-propose the entire rule in order to provide a revised cost-benefit analysis and to provide an opportunity to comment on it. One commenter specifically recommended that EPA extend the comment period to at least 60 days to allow sufficient time for adequate analyses and comment. **(American Petroleum Institute (IV-G-85), DaimlerChrysler (IV-G-117), Detroit Diesel (IV-G-112), Engine Manufacturers Association (IV-G-74), Navistar (IV-G-111), McIntosh, D., U.S. Rep. (IV-G-134)) (Also see following comments from the public hearing held in Philadelphia, PA, November 2, 1999, Docket A-98-32, IV-F-01: EMA, p. 18; AAM, p. 79; Navistar, p. 116; Detroit Diesel, p. 173; Cummins, p. 202)**

**RESPONSE:** We disagree with the suggestion that EPA failed to provide adequate notice and opportunity to comment regarding potential action regarding vehicles over 8,500 pounds GVWR. We provided notice in the original Tier 2 NPRM, as well as in the October 29 NPRM. We also disagree with the suggestion that the Tier 2 NPRM did not contemplate the expansion of light-duty standards to a segment of the heavy-duty vehicle class. Indeed, the Tier 2 NPRM requested comment on several potential options that would have applied more stringent standards to vehicles over 8,500 pounds GVWR, including the specific possibility of extending the GVWR limits that define light-duty trucks. Specifically, we requested comment on requiring "all complete trucks in the 8,500 -10,000 pound GVWR range to meet light-duty standards" (64 FR 26089). We held multiple public hearings on the Tier 2 proposal and the total comment period ran from publication of the NPRM on May 13, 1999 to the close of comments on August 2, 1999. Additionally, the NPRM stated that we would be "very likely" to finalize a provision to address vehicles over 8,500 pounds GVWR, and we did receive comment on this issue following the Tier 2 NPRM. We subsequently proposed provisions in the heavy-duty 2004 NPRM that were very similar to the option noted above, and offered a public hearing followed by a 30-day comment period for this specific issue (64 FR 58502). Given this, we believe that the public has had adequate notice and adequate opportunity to comment on this issue and that it is appropriate to finalize this provision in the Tier 2 rulemaking. The final rule considers the cost-effectiveness of the provisions that affect vehicles over 8,500 pounds GVWR.

**COMMENT C:** One commenter noted that the proposed action fails the "fair notice" due process requirement because the regulation is open to numerous interpretations.

Commenter provides appendix with detailed discussion of this argument, including cites to applicable case law, including the General Electric v. EPA decision. **(DaimlerChrysler (IV-G-117))**

**RESPONSE:** We disagree with the commenter. The regulatory language that we proposed identified the vehicles subject to these regulations as “any motor vehicle rated at greater than 8500 pounds GVWR and less than or equal to 10,000 pounds GVWR which is a complete vehicle designed primarily for transportation of persons and has a capacity of not more than 12 persons.” This language contains specific delineations of the weight and seating capacity of subject vehicles and indicated the primary use of such vehicles. The language cited by the commenter is from the background discussion in the preamble. The preamble also provides a discussion of the vehicles that will be regulated under these provisions. The regulations and preamble provide a very clear understanding of the vehicles these rules are intend to apply to. We note that the regulatory revision suggested by the commenter is virtually identical to EPA’s proposed language except for a numerical change and specifying that these are a subset of heavy-duty vehicles. Neither of these changes is at all relevant to the uncertainty the commenter claims makes this definition problematic. We also note that the final regulations add a condition regarding the size of the vehicle’s “cargo box” that should make this rule even clearer. Finally, we note that the definition is similar in format to the definition of light-duty truck, which has been in existence and has been used in the motor vehicle program for almost twenty years.

**COMMENT D:** EPA’s proposed action fails the “arbitrary and capricious” test for one or more of the following reasons: the historic precedence of treating trucks over 6,000 lbs GVWR as HDVs, not LDVs; the failure to provide any rational explanation for assumption that trucks less than 10,000 lbs GVWR are used primarily for passenger use purposes; and the lack of concrete evidence in the record of how these vehicles are used. Commenter provides appendix with detailed discussion of this argument, including cites to applicable case law. **(DaimlerChrysler (IV-G-117))**

**RESPONSE:** We do not agree that our action is arbitrary and capricious for any reasons. As noted in the preamble to the final rule and elsewhere in this document, we have modified the approach for including certain heavy-duty passenger vehicles in the Tier 2 program such that we continue to treat the subject vehicles as heavy-duty vehicles and do not reclassify them into the light-duty category, thus maintaining the historical treatment of these vehicles. The final regulations are structured such that vehicles that are clearly designed primarily for passenger transportation are subject to Tier 2 light-duty standards. The definition of these vehicles is based on design purpose, but also on GVWR, passenger capacity, and extent of exterior cargo space. These criteria are used to exclude passenger vehicles used for commercial applications (e.g., large vans) and heavy-duty vehicles designed primarily for commercial or load-carrying purposes (e.g., large pick-up trucks). The remaining vehicles that would be subject to the Tier 2 program are principally large SUVs, which, given their seating configuration and capacity, are clearly designed primarily to carry passengers. Contrary to what some commenters suggest, EPA is not regulating these vehicles based on how they are used, but on the type of use for which they are primarily designed. We did not assume in the proposal that trucks less than 10,000 pounds GVWR are used primarily for passenger transportation. Contrary to that assumption, we took explicit measures in formulating our proposal (measures that are further refined in the final rule) to exclude from the Tier 2 light-duty standards vehicles under 10,000 pounds GVWR that are clearly designed to engage in uses beyond those of most passenger vehicles (e.g., cargo vans, large pick-up trucks). The final rule took the comments into account and established a reasonable approach to including heavy-duty vehicles in the Tier 2 program; many of the vehicles that are currently excluded may in fact be used frequently under lightly loaded conditions, but given their higher potential to



operate under heavy loads it is the heavy-duty standards and test procedures that we currently judge to be more appropriate.

**COMMENT E:** Some commenters noted that the proposed definition of “light-duty truck” is inconsistent with the joint Statement of Principles (SOP) as signed by EPA, ARB and the leading engine manufacturers. The commenters added that these principles were agreed upon with the intent that engine manufacturers would be provided with the certainty, stability and extra leadtime necessary to meet the stringent engine standards that EPA might not otherwise have been able to justify or adopt, and were premised on EPA’s maintaining the current test procedures. The commenters also note that the industry has already invested significant sums in developing engines to meet standards which are now revised for the heavy duty SUVs and conclude that EPA’s proposal is inconsistent with the SOP commitments.

The commenters provide four primary reasons why the proposed revision to the definition of light duty truck is inconsistent with the SOP: first, EPA’s proposal alters the SOP since it segregates light heavy duty vehicles from the overall heavy duty class (and the SOP extends to all heavy duty engines); second, EPA’s proposal alters the SOP because it applies emissions standards to some heavy duty vehicles that are significantly more stringent than those agreed upon by the SOP signatories; third, EPA’s proposal alters the SOP since it purports to regulate heavy duty SUVs and passenger vans as light duty trucks and therefore undercuts the leadtime and stability guarantees under the SOP; and finally, EPA’s proposal alters the SOP because it mandates chassis-based testing for light heavy duty vehicles even though the standards established under the SOP are predicated on engine-based tests. **(Engine Manufacturers Association (IV-G-74), Navistar (IV-G-111)) (Also see following comments from the public hearing held in Philadelphia, PA, November 2, 1999, Docket A-98-32, IV-F-01: EMA, p. 16; Navistar, p. 114; Cummins, p. 198)**

**RESPONSE:** We do not agree with suggestions by some commenters that EPA has abandoned the agreements made in the SOP. EPA’s agreement in the SOP was to issue a proposed rulemaking consistent with provisions outlined in the SOP, which EPA did in June of 1996. The SOP acknowledged that final emission standards that emerge from the regulatory process could potentially differ from the proposal, based on public comment received on the proposal and on other factors (e.g., consistency with the requirements of the Clean Air Act). EPA’s final rule published in 1997 (62 FR 54694, October 21, 1997) notified the public that the process of reviewing the 2004 heavy-duty standards could result in more stringent standards if EPA found such standards to be feasible, cost-effective, and appropriate under the Clean Air Act. The SOP was intended to initiate a public rulemaking process by putting certain standards for heavy-duty engines on the table for public comment. It was not intended to - and it does not have the authority to - direct the outcome of a rulemaking process, either then or in the future.

### **Issue 39.3: Clean Air Act & Statutory Issues**

#### **Issue 39.3.1 Statutory Definition and Legislative History**

**COMMENT A:** Some commenters asserted that the proposed redefinition of the term “light-duty truck” exceeds EPA’s authority under the CAA and thus broadens the reach of the Tier 2 program. These commenters argue that Section 216(7) of the Act already defines “light-duty truck.” The statutory definition cites to the regulatory definition as of the date of enactment of the 1990 Amendments (November 15, 1990). That regulatory definition incorporated into the statute limits LDTs to 8,500 pounds GVWR. This specific statutory definition overrides EPA’s general rulemaking authority under section 301 to develop a

different definition. One commenter added that no other sections of the Act provide EPA with the authority to revise this definition. AAM and Ford also provide additional discussion on this issue and cite to Guidry v. Sheet Metal Workers Union Nat'l Pension Fund, 493 U.S. 365 (1990); and HCSC-Laundry v. U.S., 450 U.S. 1 (1981) to support their assertion that specific provisions take precedence over general provisions. **(Alliance of Automobile Manufacturers (IV-G-99), American Petroleum Institute (IV-G-85), Detroit Diesel (IV-G-112), Engine Manufacturers Association (IV-G-74), Ford (IV-G-82), GM/Isuzu Motors (IV-G-98), National Automobile Dealers Association (IV-G-110), Navistar (IV-G-111))**

**RESPONSE:** We agree with the commenters. Our Final Rule does not contain any revision to the definition of light-duty trucks, therefore all comments regarding EPA's authority to alter the definition of LDT's are not relevant for the final rule. Our final rule does contain the creation of a new category of HD engines and vehicles called Medium Duty Passenger Vehicles, for which authority is specifically given to the Administrator under CAA Section 202(a)(3).

**COMMENT B:** Two commenters argue that, under the Act and general principles of administrative law, EPA must apply similarly stringent standards to all categories of vehicles based on their weight. GM/Isuzu provide significant discussion on this issue and reiterated many of their concerns raised in the GM comment letter as previously submitted in response to the Tier 2 rulemaking. In support of their assertion that EPA must apply similarly stringent standards to all vehicles, GM again cites to Section 202(a)(3)(E) which requires EPA to achieve equivalency of emission reductions between different types of vehicles and Section 202(a)(3)(A)(ii) which indicates that Congress intended EPA to divide vehicles into classes based in part on weight. GM cites to several cases that generally support the assertion that, under general administrative law principles, "similar situations must be treated similarly and different situations must be treated differently." **(GM/Isuzu (IV-G-98))**

**RESPONSE:** See Responses in Issue 2.1.2., in particular 2.1.2.A.1. Nothing in the Clean Air Act prevents EPA from regulating these vehicles as part of the same regulatory program as light duty trucks, as long as the regulations pertaining to these vehicles are justified based on section 202(a)(3). Also, nothing in the Act requires that the standards for these vehicles be less stringent than those for light-duty vehicles. The commenter's reference to section 202(a)(3)(E), which pertains to motorcycles, is inapplicable.

**COMMENT C:** Two commenters referred to Section 202(b)(3)(C) of the Act, which defines heavy duty vehicles as those in excess of 6,000 lbs GVWR and the Conference Report for the 1977 CAA amendments, which concludes that "the recent classification of vehicles between 6,000 and 8,500 lbs GVWR as light duty trucks would continue to be appropriate." Based on this legislative history, one of the commenters questioned whether EPA has the authority to extend the definition of light duty trucks to include vehicles up to 10,000 lbs GVWR. The other uses this history as an argument that EPA does not have the ability under the statute to redefine HDVs above 8500 pounds GVWR as LDTs. **(DaimlerChrysler (IV-G-117), McIntosh, D. U.S. Rep. (IV-G-134))**

**RESPONSE:** As mentioned in our response to comment B, above, our Final Rule does not contain any revision to the definition of light-duty trucks (vehicles below 6,000 lbs GVWR), therefore all comments regarding EPA's authority to alter the definition of LDT's are not relevant for the final rule.

**COMMENT D:** In summary for comments on the HDV notice as a whole, including the proposed revised definition of LDT, one commenter noted that by failing to provide details or justification for many of its proposed requirements, EPA has failed to provide due process of law under the CAA. This commenter concludes that the proposed rule is arbitrary and capricious, an abuse of discretion and otherwise not in accordance with applicable law. Commenter provides significant discussion on this issue and cites to several cases and various sections of the CAA to support their position on this issue.  
**(Engine Manufacturers Association (IV-G-74))**

**RESPONSE:** With respect to the proposal covering vehicles between 8,500 and 10,000 lbs. GVWR designed primarily for personal transportation (the provision of the HDV notice being finalized in the Tier 2 final rule), we do not agree with this comment. As discussed previously (See response to comment issue 39.2), the Agency has provided sufficient detail to justify the final rule provisions for MDPVs. We have provided detailed reasons why MDPVs should meet the same standards as HLDTs (similar design principles, similar uses), we have provided technical justification that the standards are technically feasible for MDPVs in the time frame of the final standards (i.e., 2004 thru 2009), and we have acted in accordance with statutory requirements with respect to our ability to promulgate standards for heavy-duty engines and vehicles under CAA Section 202. Please refer to the October 1999 NPRM arguments on technological feasibility, the preamble to this final rule, and the response to comments under issue 39.5. Please also refer to the response to comments under issue 39.2 with respect to notice and comment and due process, and refer to the response to comments under issue 39.3 with respect to statutory requirements.

#### **Issue 39.3.2: Lead Time and Stability**

**COMMENT A:** Some commenters noted that Section 202(a)(3)(C) requires a minimum four year lead time and that changing requirements for vehicles greater than 6,000 lbs GVWR for MY2004 violates this requirement because many manufacturers commence production of new products (i.e. a new model year) during the summer or fall of the prior year (i.e. prior to December 31, 2003). **(Alliance of Automobile Manufacturers (IV-G-99), Engine Manufacturers Association (IV-G-74), Detroit Diesel (IV-G-112), Ford (IV-G-82), Navistar (IV-G-111)) (Also see following comments from the public hearing held in Philadelphia, PA, November 2, 1999, Docket A-98-32, IV-F-01: EMA, p. 19; AAM, p. 78)**

**RESPONSE:** Our final rule requirements for the new sub-category of heavy-duty engines and vehicles, Medium Duty Passenger Vehicles, provides two compliance options. As described in the preamble for this final rule, one of the compliance options available to manufacturers of MDPVs does in fact provide manufacturers with 4 years of lead-time. The alternative compliance path would provide more than 3 years, but in some cases potentially less than 4 years, of lead-time for MDPVs, however, this compliance path is optional. In addition, EPA is not requiring these vehicles to meet the heavy-duty diesel engine NMHC+NOX standards promulgated in 1997 for model year 2004, which resolves the stability issue raised by Navistar. It too becomes optional for 2004 as part of the program described above.

#### **Issue 39.3.3: Statutory Criteria (Needed to meet NAAQS, etc.)**

**COMMENT A:** Some commenters noted that the proposed redefinition of "light-duty truck" is invalid because it is not necessary to satisfy the 1-hour ozone or PM NAAQS. Two commenters also noted that EPA cannot rely on the invalidated 8-hour ozone NAAQS to justify the proposed standard. These commenters add that EPA may revise emission

standards under Section 202 only to the extent necessary to satisfy the NAAQSs, which represent the level of air quality that is requisite to protect public health, and notes that EPA must consider the cost of compliance in promulgating and revising motor vehicle emissions standards. These commenters conclude that a level of health protection that is strict enough for section 109 (without considering costs) is necessarily strict enough for section 202(a) (considering costs). The commenters add that revised statutory language in the 1990 CAA Amendments indicate Congressional intent that the standards be based on need instead of the greatest degree of emission reductions possible.

U.S. Rep D. McIntosh referred to his comments as submitted in response to the proposed Tier 2 rulemaking and again, questioned whether the proposed rule as a whole is necessary to achieve the NAAQS. Congressman McIntosh refers again to the study conducted by Abt Associates and provides some discussion regarding the potential for NOX disbenefits.

GM/Isuzu provide significant discussion on this issue (some of which is reiterated from GM's previous comment letter as submitted in response to the Tier 2 proposed rule). Commenters cite to Section 202 (several subsections) and Section 109 as well as American Trucking Ass'n Inc. v. EPA, 175 F.3d 1027, 1040 (D.C. Cir. 1999), modified on reh'g (D.C. Cir. Nos. 1440 & 1441)(Oct. 29, 1999), reh'g en banc denied (D.C. Cir. Nos. 1440& 1441)(Oct. 29, 1999) (ATA), to support their position on this issue. Commenters also provide some discussion of EPA's reliance on Section 202(a)(3)(A) and assert that the provision in this subsection that authorizes heavy duty emissions controls that reflect the greatest degree of emission reduction achievable has been superceded by Section 202(a)(3)(B) in the 1990 Amendments which provides for a cost-based standard applicable to all subsequent revisions of the emission standards of heavy duty vehicles or engines. Commenters also provide additional discussion regarding the history of the statute and the intent of various portions of Sections 202 and 109. In the context of this issue, commenters cite to A. C. Sands, *Sutherland on Statutes and Statutory Construction* Section 51.2 (4th ed. 1973); Virginia v. EPA, 108 F.3d 1397, 1413 (D.C. Cir., 1997); Greater Boston Television Corp. v. FCC, 444 F.2d 841, 852 (D.C. Cir. 1970); Greeman Eng'g Assocs., Inc., v. FCC, 103 F.3d 169, 178, 180 (D.C. Cir. 1997); and Small Refiner/Lead Phase Down Task Force v. EPA, 705 F.2d 506, 516 (D.C. Cir. 1983). Commenters also incorporate by reference their comment letter as submitted in response to the Tier 2 proposed rule and in particular to the discussion regarding attainment of the PM and the 1-hour ozone standard and to the analyses included in attachments A, C, and D. **(GM/Isuzu Motors (IV-G-98), p. 15-31; National Automobile Dealers Association (IV-G-110), McIntosh, D. U.S. Rep (IV-G-134))**

**RESPONSE:** We disagree with the comments which imply EPA has not shown that reductions from these category of vehicles are necessary to attain or maintain the NAAQS. The air quality analysis and discussion in the Tier 2 NPRM and in the final rule, as well as the air quality discussion in the heavy-duty 2004 proposal and supporting documents (64 FR 58472) clearly demonstrate that additional emission reductions are necessary and cost-effective from LD and HD engines and vehicles to attain and maintain the ozone NAAQS. It should be noted, of course, that these MDPVs are regulated under CAA section 202(a)(3), which has different criteria than section 202(i). CAA section 202(i) is not applicable to MDPVs. Please also refer to responses to Issue 27 (Environmental/Air Quality Analysis) in this document, and to the preamble and RIA for this final rule. Our analysis shows that the Tier 2 LD, LDT, and HLDT are clearly needed to assist in attaining and maintaining the ozone NAAQS in a number of areas around the country, and in fact, the analysis shows that even with the Tier 2 light-duty requirements (i.e., not including the MDPV standards) a number of areas will not be able to either attain or maintain the 1 hour ozone NAAQS. Therefore, it is clear the emission reductions provided by the standards for MDPVs are needed. We do not agree with the comments that the emission reductions

provided by the MDPV are too small to warrant the new standards, as these emission reduction will assist areas in attaining and maintaining the ozone NAAQS, and comply with the requirements of CAA Section 202. In fact, on a per vehicle basis the reductions from these vehicles are larger than for any other sub-category of vehicles with the program. We also disagree with the comment that EPA should not finalize new standards for MDPVs because of the potential for ozone disbenefits from NOX reductions, please see the Response to Comments for issue 1.2.1, issue 25.2, and issue 27.

**COMMENT B:** Two commenters asserted that the proposed redefinition of "light duty truck" is invalid since it effectively and unlawfully prohibits the use of energy saving technologies. These commenters added that EPA has not properly evaluated the energy impacts of applying the Tier 2 standards to light duty trucks and that the failure to give adequate consideration to this issue would essentially prohibit the use of lean-burn technologies and would eliminate the potential for significant improvements in fuel economy. Commenters conclude that such a prohibition would be contrary to the statutory directive to consider energy impacts.

Commenters cite to the requirements under Section 202(b)(1)(C), (a)(4)(A,B), (d), and (l)(2) to evaluate the energy impact of the rule. Commenters also cite to Ethyl Corp v. EPA, 51 F.3d 1053, 1060 (D.C. Cir. 1995); Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto Ins. Co., 463 U.S. 29, 42-43 (1983); Austin & Lyons, Analysis of Compliance Feasibility under Proposed Tier 2 Emission Standards for Passenger Cars and Light Trucks (July 1999) (aka Sierra Report as included in commenters's letter as submitted in response to the Tier 2 proposed rule as Attachment A, Appendix to Volume 1, Tab E) to support their position on this issue. **(General Motors/Isuzu Motors (IV-G-98), p. 34-37) (Also see following comments from the public hearing held in Philadelphia, PA, November 2, 1999, Docket A-98-32, IV-F-01: AAM, p. 82)**

**RESPONSE:** We disagree with this comment. First, as discussed elsewhere in this Response to Comment document, and in the preamble for this final rule, this final rule for MDPVs does in fact provide a potential - and indeed, likely - compliance path which can be met by lean-burn technologies, that is, diesel powered MDPVs, with the provision of low sulfur diesel fuel. We also disagree with the comments regarding the need to establish separate standards for lean-burn technologies or that these technologies will necessarily lead to increases in corporate average fuel economy, see the response to comments for issue 2.1.3. As noted under Issue 39.5, there are two options providing flexibility in the final rule that manufacturers may use for MDPVs under the Tier 2 program. In the interim program detailed in the final rule, both compliance path options are feasible for lean-burn (e.g., diesel) technologies. However, as a matter of practicality, most manufacturers are likely to opt for the compliance path that allows certification to the engine-based standards (grams per brake-horsepower-hour) that EPA finalized in 1997. The feasibility of these standards has been demonstrated in the 1997 rulemaking and reaffirmed in the October 29, 1999, proposed rulemaking. In the longer term, when the interim program is no longer applicable, we project that the availability of low-sulfur diesel fuel will enable technologies that further improve the feasibility of meeting the final Tier 2 standards (see Issue 39.5).

#### **Issue 39.4: Proposed LDT Definition**

**COMMENT A:** Two commenters asserted that vehicle classes should be based on the weight of a vehicle and similar engineering factors instead of vehicle use. The commenters argued that under the statute use was a valid criteria for distinguishing between a passenger vehicle and a truck, but that it was not a criteria to determine whether a vehicle belonged in the light or heavy duty class. **(General Motors/Isuzu Motors (IV-G-98))**

**RESPONSE:** We believe that the finalized approach, which creates a new category of heavy-duty vehicles (medium-duty passenger vehicle), defines this new category in a way that is consistent with the Clean Air Act. The definition of medium-duty passenger vehicle is based on GVWR, passenger capacity, extent of exterior load-carrying space, and the primary use for which the vehicle is designed. All of these are appropriate factors under 202(a)(3)(A)(ii).

**COMMENT B:** Commenters noted that EPA's approach improperly discriminates against certain heavy duty vehicles and disputed EPA's ability to classify these vehicles as a "light-duty truck." These commenters also added that a definition of a "light-duty truck" based in part on use is too vague. They noted that EPA has improperly grouped all vehicles with a particular body style such as vans, under its definition of 'passenger carrying' even though some of these types of vehicles are used almost exclusively for carrying cargo. One commenter concluded that the proposed definition of "light-duty truck" is arbitrary and capricious and that EPA should use only quantitative and objective criteria in determining this definition. Some of these commenters provided specific examples of vehicles that might fall within the definition, but that should not be regulated as HLDTs based on their designed use. Examples included vans with removable seats, airport shuttles, the GM Suburban, crew-cab pickups, and other cross-over vehicles. One commenter also provides J.D. Power survey results to document why the largest SUVs and pickups must be designed for heavy load performance, and thus should not be classified as LDTs. The commenter argued that EPA has not provided any justification for its assumption that these vehicles are not used for heavy-load purposes. **(DaimlerChrysler (IV-G-117), GM/Isuzu Motors (IV-G-98), National Automobile Dealers Association (IV-G-110), Engine Manufacturers Association (IV-G-74), Navistar (IV-G-111)) (Also see following comments from the public hearing held in Philadelphia, PA, November 2, 1999, Docket A-98-32, IV-F-01: AAM, p. 87)**

**RESPONSE:** As noted in the preamble to the final rule, our approach to applying light-duty standards to passenger vehicles over 8,500 pounds GVWR has been modified in the final rule. Rather than reclassify some heavy-duty vehicles as light-duty trucks, we have created a new category of heavy-duty vehicles called "medium-duty passenger vehicles," to which the Tier 2 program would apply. Comments that relate to EPA's ability to revise the definition of light-duty truck are accepted. These medium-duty passenger vehicles would continue to be classified as heavy-duty vehicles, but would generally be grouped with and subject to the same requirements as other vehicles under Tier 2.

EPA disagrees with commenters that its definition is vague. It is based primarily on quantitative and objective criteria. The question of whether a vehicle is primarily designed for carrying persons (as opposed to whether a particular vehicle is used for such purposes) can be answered in virtually all cases by simple review of the design of the vehicle. Many of the vehicle designs discussed in comments are exactly the types of vehicles EPA intended to regulate under these provisions. In addition, EPA has further clarified its definition to make clearer, using quantitative criteria, whether particular vehicles are covered by this rule.

We are defining medium-duty passenger vehicles as any complete vehicle between 8,500 and 10,000 pounds GVWR designed primarily for the transportation of persons. The definition specifically excludes any vehicle that (1) has a capacity of more than 12 persons total, or more than 9 persons in seating rearward of the driver's seat or (2) has a pick-up bed of six feet or more in length.

Although the medium-duty passenger vehicle category is structured similarly to the proposed definition of light-duty truck, there are some important differences that address a

number of the comments we received. In particular, we believe that we have structured the medium-duty passenger vehicle category in a way that continues to satisfy the Agency's goals but limits the potential for ambiguity and subjectivity that some commenters perceived in the proposed light-duty truck regulatory definition. The addition of the pick-up bed length criteria to the definition more clearly implements our stated goals of excluding heavy-duty pick-up trucks from the Tier 2 program. Any future offerings of vehicles that are equipped with significantly shorter beds would be included in the MDPV category, if the vehicle also met the weight and seating capacity criteria. Additionally, we believe that vehicles with rear seating capacity in excess of nine passengers are likely to be engaged in more heavy-load applications, and therefore we have refined the passenger capacity criteria to reflect this and clearly exclude large passenger vehicles which are used primarily for commercially-related heavy-duty purposes. Potentially excluded vehicles include some of the vehicles noted by commenters, such as typical airport shuttles and crew-cab pick-up trucks. These are excluded because of their likelihood to experience more frequent heavily loaded operation and more rigorous use conditions.

We do not disagree with the commenter's assertion that some of the vehicles captured by the medium-duty passenger vehicle definition will be used for occasional towing or under other potentially heavy-load conditions. We have not assumed that these vehicles never experience the highly loaded type of operation of which they are capable. But the peak loaded use of the expanded capabilities of these types of vehicles should not be the defining characteristic for determining the applicability of appropriate emission standards, because it is rare that such use is representative of the typical operational characteristics experienced by the vehicle. In addition, the usefulness of the J.D. Power survey cited by the commenter may be limited. In particular, the statement that "over half of the light-duty truck and Sport Utility Vehicle (SUV) owners use these vehicles to tow boats or trailers" appears to include pick-up trucks, heavy-duty versions of which are generally not going to be subject to Tier 2 standards under the provisions of the final rule. The survey does appear to confirm that light-duty trucks and SUVs are not purchased exclusively to fulfill towing or off-road types of functions; owners indicated that they used these vehicles to "transport kids/family" and "carpool to work/school" at essentially the same rate as owners of passenger cars. Finally, it is difficult to determine to what extent the J.D. Power survey even addresses the uses of trucks over 8,500 pounds GVWR, since the survey does not appear to define what it means by its use of the term "light-duty truck."

**COMMENT C:** One commenter noted that provided the proposed definition does not apply to manufacturers that manufacture only chassis and not engines of any kind, they do not have any position on the proposed change. This commenter noted that if the proposed rule would apply to or affect those commercial use vehicles under 10,000 lbs GVWR for which they manufacture chassis, then they are opposed to the proposed change as technologically infeasible given the primary use and design of the vehicles for which their chassis are used, which include motor homes, commercial step vans, and school buses.  
**(Workhorse Custom Chassis, LLC (IV-G-108))**

**RESPONSE:** Based on our knowledge of the product line manufactured by the commenter, we do not believe that they manufacture anything that would be classified as a medium-duty passenger vehicle. Medium-duty passenger vehicles are complete vehicles from 8,500 to 10,000 pounds GVWR that meet other certain criteria, and therefore the final regulations would not affect the incomplete vehicles manufactured by the commenter.

**COMMENT D:** One commenter did not express opposition to the change in the definition of "light-duty truck" but noted that as proposed, this definition is confusing since a light duty truck may be assigned to a particular class not only because of its weight but also because of its usage and other factors. This commenter adds that moving from one emissions

model to another or from the CAA definition of a heavy duty vehicle to EPA's definition adds to the confusion and requests clarification on exactly how the affected vehicles will be classified. **(Wisconsin Department of Transportation (IV-G-89))**

**RESPONSE:** We believe that the provisions as finalized resolve the confusion perceived by the commenter.

**COMMENT E:** One commenter noted that the proposed rule should cover all vehicles up to 10,000 lbs GVWR regardless of use since the engine families used in these vehicles are similar if not identical. **(Georgia Department of Natural Resources (IV-G-90))**

**RESPONSE:** We do not agree. See the response to Comment G below.

**COMMENT F:** Some commenters noted that the proposed definition for light duty trucks between 8,500 and 10,000 lbs GVWR should not be limited to those vehicles with a capacity of up to 12 passengers and added that many of these vehicles are designed to carry up to 15 passengers. These commenters recommended that the restriction on passenger capacity be removed from the proposed rule. **(STAPPA/ALAPCO (IV-G-109), Georgia Department of Natural Resources (IV-G-90), Massachusetts Department of Environmental Protection (IV-G-94), NESCAUM (IV-G-114), Environmental Defense Fund (IV-G-107))**

**RESPONSE:** We do not agree. See the response to Comment G below.

**COMMENT G:** Some commenters noted that EPA should apply the proposed rule to all passenger vehicles regardless of weight. **(Environmental Defense Fund (IV-G-107), Sierra Club (IV-G-95))**

**RESPONSE:** We do not agree that the Tier 2 program standards are appropriate for all passenger vehicles regardless of weight and/or the capacity to transport persons, as some commenters have suggested. As noted above, we continue to believe that certain types of heavy-duty vehicles between 8,500 and 10,000 pounds GVWR, as well as those over 10,000 pounds GVWR, should continue to be subject to the otherwise applicable heavy-duty emission standards and test procedures. In our consideration of emission standards for vehicles over 8,500 pounds GVWR, we must evaluate such standards against the Clean Air criteria of most stringent available while taking into consideration cost-effectiveness and feasibility. At this time we believe the final rule demonstrates that these criteria are met for the new category of medium-duty passenger vehicles, but that remaining heavy-duty vehicles are more appropriately subject to applicable heavy-duty emission standards, for reasons stated in the final rule and elsewhere in this document. Further discussions of which heavy-duty vehicles are subject to light-duty standards under this final rule, as well as of vehicles that will continue to be subject to heavy-duty standards, can be found under Comments 39.2 D and 39.4 B. We understand concerns that commenters have raised regarding the creation of a "bright line" at 10,000 pounds GVWR and the potential for additional product offerings above 10,000 pounds GVWR. As some of these commenters have acknowledged, EPA is in the process of developing a proposed regulation that would address more stringent standards for the heavy-duty vehicles not covered by Tier 2. We will provide additional opportunities for public participation and input regarding standards for these vehicles in the context of this future rulemaking effort.



**COMMENT H:** Two commenters recommend either the approach of establishing the limit at 8,500 lbs GVWR or establishing a standard that applies to only those vehicles that are devoted to less than 50 percent load carrying. Other commenters suggest that EPA create a new HDV category for the 8,500-10,000 pound GVWR vehicles, and then establish technologically feasible standards for that new category. **(Alliance of Automobile Manufacturers (IV-G-99), DaimlerChrysler (IV-G-117), Ford (IV-G-82), GM/Isuzu (IV-G-98))**

**RESPONSE:** As reflected in the final regulations, we agree that the application of Tier 2 light-duty standards to specific types of heavy-duty vehicles is best accomplished by creating a new category of heavy-duty vehicles. The final rule takes exactly this approach by creating the medium-duty passenger vehicle class of heavy-duty vehicles. We did assess the possibility of using criteria based on the proportion of a vehicle's GVWR dedicated to passenger or load carrying, as suggested by some commenters (we assessed other possible criteria as well), to define the new class of heavy-duty vehicles, but found that many of these either did not capture the appropriate vehicles or were fraught with potential implementation difficulties, a greater possibility of being gamed, or lack of clarity. The structure of the final regulations best achieves EPA's objectives regarding ease of implementation, clarity, and precision with regard to capturing appropriate vehicles.

### Issue 39.5: Technical Feasibility

**COMMENT A:** Some commenters generally noted that EPA has not demonstrated that it will be feasible for passenger vehicles between 8,500 to 10,000 lbs GVWR to meet the Tier 2 standards. Some of these commenters raised concerns specific to the ability of light heavy duty diesel vehicles to meet the Tier 2 standards. Two commenters also noted that the emissions averaging framework (including an additional interim emissions bin set at 0.9 g/mi NOX and 0.12 g/mi PM) is not flexible enough to accommodate these vehicles. The commenters provided an example to document that the additional bin would not enhance flexibility in the manner EPA believes. **(Engine Manufacturers Association (IV-G-74), National Automobile Dealers Association (IV-G-110), Navistar (IV-G-111), GM/Isuzu Motors (IV-G-98))**

**RESPONSE:** Some commenters argued that the standards for 8,500 - 10,000 pound GVWR vehicles such as SUV's must recognize that these vehicles are sometimes exercised in a manner more typical of a commercial heavy-duty application, operation such as sustained towing. We agree that this type of operation is more typical for some vehicles greater than 8,500 pounds. From a technical perspective, peak-operation results in high exhaust gas temperatures which could in some cases lead to accelerated catalyst deterioration. Manufacturers normally specify catalysts with adequate margins to cover high temperature operation in all but the worst case situations. We believe that for the majority of operation of the vehicles which will be classified as MDPV, such as passenger vans and SUVs, peak-performance operation is not the norm, and we do not believe it is appropriate to establish lower standards for the entire category of MDPV's based on the relatively small number of vehicles which may operate at or near peak-performance. As discussed in the preamble for the final rule, we have instead decided to consider providing those types of vehicles additional flexibilities for in-use compliance which would recognize the potential for more extreme catalyst deterioration caused by the high temperatures resulting from significant operation at or near peak-performance conditions.

#### Diesel MDPVs

We believe that the Tier 2 standards are feasible for diesel-equipped MDPVs considering the flexibilities in the final rule with respect to lead-time, the two standard paths leading up to 2008, the interim standards, and phase-in structure, if lower sulfur diesel fuel is made available. In response to the comments received on the technical feasibility of the proposed standards for diesel powered vehicles in the 8,500 - 10,000 pounds, we have made a number of changes to the final rule. The final rule provides two options for diesel MDPVs, which provide further flexibility.

As discussed in the preamble for this final rule, one of the optional set of standards for diesel MDPVs is to meet the applicable heavy-duty diesel engine based standards from 2004 thru 2007. In 2008, all diesel MDPVs would need to be chassis certified, and they would be averaged with HLDTs so that, as a whole, 50 percent would meet the Tier 2 Interim HLDT/HD MDPV Interim standards, and 50 percent would meet the Tier 2 standards. However, the final rule contains one additional, higher bin for MDPVs in the Interim standards, with a NOX standard of 0.9 g/mile and a PM standard of 0.12 g/mile. Finally, in 2009, 100 percent of the diesel MDPVs would need to be included in the averaging set (along with gasoline MDPVs and all HLDTs) which meets the Tier 2 0.07g/mi NOX level, with an upper cap at the highest Tier 2 bin of 0.2 g/mi NOX.

As discussed in the preamble for this final rule, the second standards option for diesel MDPVs is to meet a chassis based NOX level in the years 2004 thru 2007 which conform with the same requirements applicable to LDT3s and LDT4s. That is, they would choose an emissions bin laid out in the Tier 2 HLDT requirements, and they would meet an

average NOX level of 0.2 g/mi NOX, and be capped at a 0.6 g/mi NOX (the highest bin). The MDPVs would not be averaged separately from the HLDTs, but would be included in the averaging set with the HLDTs to meet the Tier 2 Interim standards for HLDTs and MDPVs.

As we have argued in the recent HD 2004 proposal (64 FR 58472), the 2004 heavy-duty diesel engine based standards are clearly feasible with current diesel fuel sulfur levels, and we believe the highest Tier 2 interim standards bin, 0.9 g/mile NOX and 0.12 g/mile PM, is achievable by 2008 using known technologies with current diesel fuel sulfur levels, as is the 0.60 g/mile NOX level. Please refer to the response to comments under issue number 26, in particular, issue number 26.1.2. We recognize that reductions in diesel fuel sulfur sufficient to enable effective PM and NOX aftertreatment, such as advanced PM traps and NOX adsorption catalysts, will be necessary for diesel engines to meet the final Tier 2 standards. Both Ford and AAM have provided data to the docket documenting NOX aftertreatment under lean exhaust conditions that is 70 to 85% efficient when used with very low sulfur diesel fuels. Similarly, data for PM traps provided by Ford and MECA has demonstrated PM reductions from 80% to greater than 90% when used with such fuels. A separate rulemaking process, initiated with the Diesel Fuel ANPRM, will address diesel fuel sulfur levels prior to full implementation of the final Tier 2 standards for MDPVs.

In summary, the final rule for diesel MDPV provides two optional standard paths between 2004 and 2007. We believe one of these paths (allowing certification to the applicable HD diesel engine based standard), is clearly feasible in this time frame, and the second path (0.2 g/mi NOX average with 0.6 g/mi NOX cap), should be within the reach of diesel MDPV's in the 2004 - 2007 time frame. The 2008 requirements, given the significant lead time and averaging flexibilities (Tier 2 interim program with 0.9 g/mi NOX cap), are also technologically feasible. Finally, provided low sulfur diesel fuel is available, we believe the Tier 2 standards will be achievable for diesel MDPVs with advanced aftertreatment technologies.

#### Gasoline MDPVs

The EMA commented that the proposed standards for the category of gasoline MDPV vehicles are not technically feasible. However, no substantive data or arguments to support this assertion were provided. In addition, the final rule provides an optional standards path which would allow gasoline MDPVs to certify to the interim program with an additional emissions bin of 0.9 g/mile NOX and 0.28 g/mile NMOG through 2008. These standards are clearly feasible in the 2004 time frame, as manufacturers have already chassis certified gasoline complete vehicles in the 8,500 to 14,000 pound category to these levels in California. As discussed in the proposal for this sub-category of HD vehicles ( FR -58502 - 58507), as well as the RIA and preamble for this final rule, we have made sufficient technical arguments, and provided supporting data, which support the technical feasibility of the standards for gasoline MDPVs contained in the final rule.

**COMMENT B:** One commenter noted that given that some gasoline fueled vehicles between 8,500 to 10,000 lbs GVWR in the California Medium Duty program are already approaching the Tier 2 NOX standard, it is technologically feasible to bring these types of vehicles into the program. However, this commenter questioned whether EPA will still be able to maintain the uniformity and fuel-neutrality goals of the Tier 2 program and recommended adding another bin for heavy light duty trucks greater than 8,500 lbs GVWR to provide additional flexibility for manufacturers of diesel vehicles. Other commenters pointed to EPA and CA certification data for the 1998/1999 model years as evidence that these large HLDTs should be able to meet the interim and final Tier 2 standards.

**(American Lung Association (IV-G-118), STAPPA/ALAPCO (IV-G-109), Wisconsin**

**Department of Transportation (IV-G-89)) (Also see following comments from the public hearing held in Philadelphia, PA, November 2, 1999, Docket A-98-32, IV-F-01: MECA, p. 122; NESCAUM, p. 139; ALA, p. 165)**

**RESPONSE:** In general, we agree with these comments. We also believe the MDPVs will be able to achieve the final Tier 2 standards. We understand the commenters concerns with fuel neutrality for the category of MDPVs, and in fact, the final Tier 2 program is a fuel neutral program, including fuel neutral standards for all MDPVs.

**Issue 39.6: Timing, Phase-In, Structure, and Stringency of Standards**

**COMMENT A:** Some commenters noted that EPA should require passenger vehicles of all sizes to comply fully with the new emission standards no later than 2007. One commenter added that there is no reasoned technological or economic basis for deferring the air quality benefits associated with bring all heavy light duty trucks into compliance with the Tier 2 standards at the same time as other passenger vehicles. **(Environmental Defense Fund (IV-G-107), Clean Air Network (IV-G-106), Sierra Club (IV-G-95), Wasatch Clean Air Coalition (IV-G-79)) (Also see following comments from the public hearing held in Philadelphia, PA, November 2, 1999, Docket A-98-32, IV-F-01: STAPPA/ALAPCO, p. 28; NRDC, p. 47; Breeze, p. 62; Boykin, p. 86; Sierra Club, p. 89; PennPIRG, p. 97; Campbell, p. 109; Lopez, p. 111; CAN, p. 152; USPIRG, p. 159; ALA, p. 165; NET, p. 171, 205; CAC, p. 208; Sowell, p. 221)**

**RESPONSE:** We understand the desire of many individual citizens and environmental organizations, who wish to see the time table for MDPVs compliance with the Tier 2 standard accelerated from 2009 to 2007. However, of all categories of vehicles which must meet the Tier 2 standards (LDV, LDT, HLDT, MDPV), the MDPV will clearly have the most difficult task. These vehicles have the furthest to come, and the additional two years provided to manufacturers for these vehicles is warranted. In the long run, these vehicles will provide the largest reductions of any Tier 2 vehicle group. However, they will benefit from the learning that industry achieves for HLDTs.

**COMMENT B:** Two commenters noted that EPA cannot promulgate new standards without first determining their stringency. These commenters note that to include vehicles between 8,500 and 10,000 lbs GVWR is a change in the form of the emission standard since the light duty vehicle standards are defined in grams of emission per mile and the heavy duty standards are in grams per brake horsepower-hour of engine work. For heavy duty engines, it is necessary to denominate the emission standard in a manner that limits the emission per unit of work performed instead of distance traveled. Therefore, to accurately determine the stringency of the proposed standards on the heavy duty vehicles, EPA would have to apply a conversion factor for determining the equivalence between a gram per mile standard and a gram per horsepower-hour standard. These commenters cite to EPA's acknowledgment in the context of the ABT program that determining an accurate conversion factor between the two different forms of emission standards is difficult and requires consideration of individual vehicle characteristics. The commenters argue that even though EPA is requiring a derivation of accurate vehicle specific conversion factor before allowing emission credit exchanges, the Agency has not performed the necessary vehicle-specific analyses to determine how stringent the Tier 2 standards will be for the vehicles in question. The commenters conclude that it is arbitrary and capricious for EPA to promulgate emission standards for vehicles without determining their stringency. **(GM/Isuzu Motors (IV-G-98))**

**RESPONSE:** We disagree with the comment that the Agency must develop conversion factors between chassis and engine tested MDPVs prior to establishing standards for MDPVs. This comment is simply not relevant. As described in the proposal to include certain 8,500 - 10,000lb heavy-duty vehicle in the Tier 2 standards program, manufacturers have been chassis certifying these vehicles in California for a number of years, therefore significant data is available on which to base the standards and evaluate their stringency, and to compare current technology vehicles to future standard levels (See 64 FR 58506 and 58507). In addition, we believe the technological feasibility information presented in the Tier 2 proposal for HLDTs is relevant for MDPVs because these vehicles are similar in size and design. In fact, we have previously noted that manufacturers are reaching very

low emission levels already. The draft Regulatory Impact Analysis document for the Oct. 29, 1999 Heavy-duty NPRM included 1998 and 1999 data from the California Medium Duty Vehicle program (See draft RIA, Chapter 3, available in EPA Air Docket A-98-32, also see 64 FR 58506 - 58507 and 58519). The full useful life (120,000 mile) certification data for some of these vehicles is summarized below. These data clearly indicates that a 0.9 g/mi NOX level and a 0.6g/mi NOX level is technologically feasible by the 2004 time frame, and it indicates the manufactures are approaching the 0.2 g/mi NOX level on some engine families today.

Manufacturer	Model	Engine Size (l)	GVWR (pounds)	NOX (g/mi)	HC (g/mi)
Ford	E250 Econoline	5.4	8,550	0.289, 0.446	0.295, 0.300
General Motors	K2500 Suburban	5.7	8,600	0.6	0.22
General Motors	C/K2500, 3500, Suburban	6.0	8,600	0.5	0.15

For both of these reasons, additional information is not needed for the Agency to establish chassis based standards for MDPVs. The comments regarding the Agency's HDV proposal for the development of conversion factors between chassis tested and engine tested engine families is not relevant to the Tier 2 program, since no trading of credits between engine and chassis tested families was proposed or has been finalized in the context of the Tier 2 final rule for MDPVs. EPA does not agree that it is required to set HD standards in the form of emissions per unit of work versus distance traveled. CAA section 202(a)(3) provides the EPA discretion to establish either type of standard, for appropriate reasons.

**COMMENT C:** Two commenters noted that the proposed change will significantly increase the compliance burden since it will require conversion to a new, expanded chassis-based rather than an engine-based testing and certification system. **(Engine Manufacturers Association (IV-G-74), Navistar (IV-G-111))**

**RESPONSE:** We disagree with the broad assertions by some commenters that the shift from engine-based testing to chassis-based testing will impose large, new cost burdens for all manufacturers of MDPVs. For gasoline MDPVs, manufacturers who sell vehicles in the 8,500 - 14,000 pound complete vehicle category in California already must chassis certify this vehicles to CARB standards. All major U.S. gasoline MDPV producers sell those vehicles to the California market, and therefore these manufacturers already have the infrastructure to test gasoline chassis HD vehicles in the 8,500 to 10,000 pound category. However, we recognize that some diesel manufacturers do not currently have emissions-capable chassis dynamometer facilities. Assuming diesel MDPV manufacturers would choose the standards option which allows them to certify to the applicable HD diesel engine standards from 2004 thru 2007, diesel chassis test cells would be required for 2008. While the cost of installing a diesel chassis test cell is not trivial (perhaps \$2.5 to \$ 5 million), the impact of including diesel chassis test cell installation costs would be extremely small compared to the total cost of the Tier 2 program. In fact, most manufacturers have already installed chassis cells for research and development purposes in response to other needs.



**Issue 39.7: Costs/Cost-effectiveness**

**COMMENT A:** Two commenters asserted that the proposed redefinition of “light-duty truck” is invalid since the Tier 2 standards applicable to these vehicles are not economically feasible for those that use lean-burn fuel efficient technologies. These commenters noted that they have determined that diesel-fueled vehicles in the 8,500 - 10,000 lb GVWR weight class might satisfy the Tier 2 standards of 0.01 g/mi PM and 0.07 g/mi NOX only if they used a number of emissions control devices, such as cooled EGR (high-flow), combustion optimization, improved fuel injection, variable geometry turbochargers, onboard diagnostics, diesel oxidation catalysts, urea-based selective catalytic reduction systems, and diesel particulate filters and noted that together, these devices would comprise greater than 10 percent of the cost of the vehicle. The commenters added that it cannot be assumed that the averaging and banking provisions will be adequate to ensure compliance.

Commenters cite to Section 202(a)(2), and (a)(3)(B) as well as to NRDC v. EPA, 655 F.2d 318, 333 (D.C. Cir. 1981) in discussing the requirements for determining technological feasibility, costs, and resolving any outstanding issues regarding technological feasibility. Commenters incorporate by reference their comments as submitted in response to the Tier 2 proposed rule and in particular to the discussion in Volume 1, p. 49-51 (Attachment A) to support their position on this issue. In the context of the cost of control technologies for lean-burn engines, commenters cite to a cost memorandum which contains confidential information and has been submitted to the Agency under separate cover. In asserting that an assumption of feasibility may not be predicated on factors the manufacturers cannot control (and that the ABT program may not provide adequate flexibility to allow for compliance) commenters cite to City of Oswego v. FERC, 97 F.3d 1490, 1498 (D.C. Cir. 1996); Chrysler Corp. v. EPA, 631 F.2d 865, 888 (D.C. Cir.) Cert. Denied, 449 U.S. 1021 (1980). **(GM/Isuzu Motors (IV-G-98), p. 32-34)**

**RESPONSE:** We disagree with the comment that the Agency cannot finalize Tier 2 standards for MDPVs because of the cost which would be born by the lean-burn (i.e., diesel) MDPVs. As described in the preamble for this final rule, we have demonstrated that these standards are cost-effective for the category of MDPVs as a whole, and there is no requirement in the CAA for the Agency to demonstrate cost-effectiveness for a category or sub-category of HD based specifically on fuel use, under the circumstances present here. It is indeed worth noting that we believe that the averaging and banking provisions will be an important part of the industry's overall strategy. It allows lean-burn engines to certify as high as 0.20 g/mi NOX and 0.02 g/mi PM. This flexibility should reduce the technological difficulty and cost.



**Issue 39.8: Onboard Refueling Vapor Recovery**

**COMMENT A:** Two commenters expressed general support for applying Onboard Refueling Vapor Recovery (ORVR) requirements to complete Otto-cycle vehicles from 8,500 to 10,000 pounds GVWR where such vehicles have “sister” counterparts under 8,500 pounds GVWR. They note that applying ORVR to these vehicles would be straightforward. However, for vehicles lacking a light-duty counterpart, and for vehicles with fuel tanks with a capacity greater than 35 gallons, the commenters request additional lead time. Specifically, they request that vehicles in these two categories be exempted from the phase-in until the final year, model year 2006.

**(Engine Manufacturers Association (IV-G-74), Ford (IV-G-82))**

**RESPONSE:** The phase-in of the ORVR requirements is structured in a way that should resolve the issues raised by the commenters. The ORVR requirements for medium-duty passenger vehicles are phased in with 40 percent compliance required in the 2004 model year, 80 percent compliance in the 2005 model year, and 100 percent compliance required in the 2006 model year. This is the same phase-in rate as is currently in place for the HLDTs. Further, we are allowing the MDPVs to be combined with the HLDTs for the purposes of meeting the ORVR phase-in requirements. Given their sales relative to HLDTs, manufacturers should have sufficient flexibility under this structure to forestall ORVR requirements until the 2006 model year for those vehicles cited by the commenters where implementation of ORVR may involve some additional challenges.

### **Issue 39.9: Onboard Diagnostics**

**COMMENT A:** A number of commenters raised issues relevant to the application of Onboard Diagnostic (OBD) requirements to MDPVs. Many expressed support for applying OBD requirements to the entire heavy-duty category. Two commenters, while expressing general support for applying OBD to heavy-duty vehicles under 14,000 pounds GVWR, also noted some specific reservations. These commenters stated that any monitoring of diesel catalysts is unnecessary and technologically infeasible, that emission-threshold monitoring of diesel PM traps is infeasible, that a phase-in should allow engines and vehicles to be combined, that EPA deficiency allowances are insufficient (only one allowed, no hardware deficiencies allowed, and carry-over allowed for only one year), that EPA's catalyst monitor threshold is inconsistent with CARB requirements, and that OBD threshold levels for diesels should be based only on the FTP and not any supplemental test procedures. **(American Lung Association (IV-G-118), Engine Manufacturers Association (IV-G-74), Ford (IV-G-82), Massachusetts Department of Environmental Protection (IV-G-94), National Automobile Dealers Association (IV-G-110), Navistar (IV-G-111), Sierra Club (IV-G-95), Wisconsin Department of Natural Resources (IV-G-135))**

**RESPONSE:** The approach taken in the final rule resolves most of the issues raised by the critical commenters or renders them moot. In addition, if irrelevant to MDPVs but not to other heavy-duty vehicles, these issues should be addressed in the context of EPA's ongoing heavy-duty rulemaking. Nothing in the final rule requires monitoring of diesel catalysts or PM traps for MDPVs, or the addition of supplemental test procedures. EPA is addressing these issues as they relate to other heavy-duty vehicles in a separate rulemaking process. Since the requirements for MDPVs apply only to complete vehicles, the issue of combining the phase-in with engines is moot. Finally, the OBD requirements applicable to MDPVs allow compliance with the California OBD-II provisions as an option, thus allowing a California OBD-II system to satisfy the federal OBD requirements. This should eliminate issues of inconsistency between federal and California regulations. The deficiency allowances for MDPVs should be quite adequate. With respect to allowing only one deficiency and carry-over of only one year, these limitations are intended to prevent a manufacturer from using the deficiency provisions as a means to avoid compliance or delay implementation of any OBD monitors or to compromise the overall effectiveness of the OBD program. While we do not intend to allow more than one deficiency per engine family, the regulations do not specifically preclude the Administrator from allowing more than one. Hardware deficiencies (where OBD hardware is at fault or not present) should not be needed because of the lead time available, the extensive implementation of OBD that has already occurred in the heavy-duty arena absent federal regulation, and the experience gained by manufacturers both in implementing OBD in light-duty applications and in medium-duty applications in California. There are currently, for all practical purposes, no differences in diesel aftertreatment monitoring requirements between the CARB OBD-II requirements and the federal OBD requirements. While we have proposed changes to our requirements that would, if finalized, result in different monitoring requirements, comments pertinent to that proposed change should be addressed to the heavy-duty 2004 NPRM of October 29, 1999.

**Issue 40: Comments Received on June and October Supplemental Notices**

**COMMENTER: Alliance of Automobile Manufacturers (AAM) (IV-G-40)**

The Alliance raises several issues in this letter (see AAM Comments A-G below). EPA provides a separate response to each of these issues.

**AAM COMMENT A:** AAM reiterates their comments on the rollback method and its inconsistency with EPA's latest guidance on the issue, the overly large grid size that incorrectly characterizes the VOC to NO<sub>x</sub> mix in urban plumes, the inaccuracy of the biogenic inventory, and the unrealistically high stack exit velocities for a number of point sources. Once EPA's models are revised to correct for identified anomalies, it is clear that the current Tier 1/NLEV motor vehicle control program and other planned controls will be sufficient. No additional controls are necessary to meet the requirements of the CAA (cites to Section 202(a), 202(i)(2)(A)). AAM also reiterates their recommendation to adopt their proposal as an alternative to the proposed Tier 2 program and noted that fine grid modeling should be used by EPA to evaluate whether the Tier 2 program is justified under the CAA as compared to the Alliance proposal.

**RESPONSE:** See our response to Issue 27.4.B.1 with respect to grid size and biogenic issues, our response to Issue 27.4 D with respect to residual nonattainment, and the response to Issue 27.4.E with respect to the rollback method of predicting nonattainment.

**AAM COMMENT B:** EPA should not rely on the exceedance method for determining the necessity of Tier 2. AAM provides a complete analysis of the exceedance method's bias, which they performed by mapping all cells in the entire OTAG domain to specific counties using the OTAG file descriptions of cell boundaries. This analysis shows that EPA's exceedance methodology over-predicts actual ozone levels four times more frequently than it under predicts those levels and therefore, misclassifies the attainment status of a significant number of counties and overstates the magnitude of the non-attainment problem. AAM provides significant discussion on this issue and provides specific examples where use of the exceedance method provides an inaccurate estimation of ozone levels and/or non-attainment.

**RESPONSE:** See our response to Issue 27.4.E.

**AAM COMMENT C:** AAM cites air quality modeling performed by ENVIRON, AIR, and Alpine, which demonstrates that future nonattainment issues will be confined to very few counties and notes that more recent modeling runs have now confirmed much of the initial results from these models. AAM provides a detailed discussion of the latest modeling results and concludes that no counties will remain in significant non-attainment in the midwest and northeast (with only one northeast county in technical non-attainment), that the elevated ozone concentrations in the Baton Rouge (Iberville Parish) area appear to have been caused by a lack of definition in the OTAG model for that region (and thus requires additional analysis), and that Houston's nonattainment issues are mostly attributable to non-mobile source emissions.

**RESPONSE:** See our response to the automobile industry's ozone modeling in Issues 27.4.D. and 27.4.E.

**AAM COMMENT D:** The Tier 2 program would actually increase ozone levels in many highly populated areas due to the NO<sub>x</sub> disbenefit effect. AAM cites to both air quality

modeling performed by ENVIRON as well as recent air quality data from Clean Air Network and Clean Air Task Force (i.e. Appendices B and C of their Clean Air Report), which support the weekday/weekend and the NO<sub>x</sub> disbenefit effects. AAM notes that the number of exceedances of the 8-hour standard reported in Appendix B of the Clean Air Report shows more exceedances on the average weekend day as compared to the average weekday and added that despite the widespread exceedances of the 8-hour standard, the geographic extent of exceedances of the 1-hour standard is very narrow.

**RESPONSE:** See our response to Issue 27.1.H. for EPA's response related to ozone disbenefits, including our specific comments on the Environ analysis and on weekday/weekend comparisons.

**AAM COMMENT E:** Fuel sulfur control is a cost-effective strategy, particularly when it is considered as part of an integrated Tier 2 program. However, calculating the cost-effectiveness of vehicle and fuel controls on a per-vehicle basis is an inaccurate method that does not capture the actual comparative costs and benefits of the various proposed standards. The cost-effectiveness analyses should calculate costs and benefits on a vehicle-fleet basis. This approach captures real-world emission reductions that accrue from the Tier 1 and NLEV vehicles operating on low-sulfur fuel. The comparison of the cost-effectiveness of Tier 2 controls versus controlling fuel sulfur to 30 ppm should be done on a consistent basis. AAM cites to the comments as submitted by API, which implicitly assume that vehicle controls should be implemented before fuel sulfur controls, and notes that any control measure that is assumed to be imposed first will appear to have a cost-effectiveness advantage. AAM provides a detailed discussion on the issue of performing an accurate cost-effectiveness analysis (and includes their cost-effectiveness estimates), which should be completed consistently between vehicle and fuel sulfur controls, should be performed on a vehicle-fleet basis, and should focus on the period between 2004 and 2007.

**RESPONSE:** See our responses to Issues 24.1.A.1 and 24.1.F concerning EPA's rationale for considering cost-effectiveness for vehicles and fuels in a combined manner rather than separately, and our response to Issue 24.2.E for our analysis of a fuel-only control scenario. See also the response to 24.1.G concerning a vehicle-fleet based cost analysis.

**AAM COMMENT F:** In the context of their comments on performing an accurate cost-effectiveness analysis, AAM adds that consideration of EPA's estimates of benefits from SO<sub>2</sub> and PM emissions suggests fuel sulfur controls are even more cost-effective. If SO<sub>2</sub> and PM credits are included in the estimate of the cost-effectiveness of sulfur controls, the lifetime cost of these controls is reduced significantly.

**RESPONSE:** In both our proposal and in this final rule we have included estimates of cost-effectiveness which include credits for SO<sub>2</sub> and PM emission reductions.

**AAM COMMENT G:** In EPA's methodology for considering SO<sub>2</sub> and PM credits, EPA has assumed that only one percent of sulfur emitted from tailpipes forms sulfate. This value, for which no reference is provided, is inconsistent with the two percent value used in EPA's PART5 model. In addition, EPA has included indirect sulfates in its cost-benefit estimate but did not include these in the cost-effectiveness analysis. EPA should clarify these discrepancies.

**RESPONSE:** Whether the correct value for sulfate conversion is one percent or two percent is relatively inconsequential since the PM credit which results from either is so small. Changing our estimate to two percent would change the cost used in the cost-

effectiveness calculation by less than \$4. Indirect sulfate is formed from the SO<sub>2</sub> emitted from the tailpipe. Our cost-effectiveness crediting already accounts for the SO<sub>2</sub>; to add a credit for sulfate would be a form of double counting. The benefits analysis air quality modeling, on the other hand, estimates atmospheric sulfate resulting from the SO<sub>2</sub> emissions as part of the air quality projections. This is the proper approach in dealing with health effects and is not inconsistent with the cost-effectiveness methodology.

**COMMENTER: IL EPA (IV-G-63)**

**COMMENT:** Illinois and Missouri share a common 1-hour nonattainment area (St. Louis). In the attainment demonstrations, these states have included benefits from EPA's low sulfur gasoline proposal. EPA should reverse its position that this measure may not be used in these attainment demonstrations because of the attainment date chosen by the States for the area. Illinois and Missouri have assumed an attainment date of 2003, which is not required and is simply the earliest possible date. Consistent with EPA's practice with regard to attainment dates, the two-year extension will allow demonstration of attainment by 2005, which would include two years' benefit of low sulfur gasoline. Illinois and Missouri should be able to count on the reductions that will be obtained from low sulfur gasoline.

**RESPONSE:** The request by the Illinois EPA that U.S. EPA allow Illinois and Missouri to assume credit for emission reductions from low sulfur fuel in the St. Louis attainment demonstration is not relevant to the promulgation of the Tier 2/Gasoline Sulfur program, although we do agree that the emission reductions from the program will result in ozone reductions in St. Louis. The request will be considered in our action on the SIP submittals for St. Louis.

**COMMENTER: STAPPA/ALAPCO (IV-G-64)**

**COMMENT:** STAPPA/ALAPCO express their support for the national reinstatement of the 1-hour ozone standard and reiterate the importance of Tier 2 controls and reductions in sulfur levels in gasoline with respect to health, welfare, and attainment of the ozone standard. These rules are important irrespective of the proposed reinstatement, but the reinstatement provides even more reason to promulgate the rules. This commenter cites to examples in 14 states that support their assertion that the reductions in ozone that would result from the Tier 2 and low-sulfur gasoline programs are necessary to improve health and ensure progress toward attainment.

**RESPONSE:** See our response to Issue 1.1.B and Issue 27, generally.

**COMMENTER: WI DNR (IV-G-72)**

**COMMENT:** WI DNR supports the Tier 2 rule and notes that the reductions that will result from this rulemaking are essential to making progress toward achievement of the ozone standard in the Milwaukee/Racine and the Chicago/Gary/Kenosha areas. This commenter notes that even with the NO<sub>x</sub> SIP Call and the Tier 2 rule, these areas may still be in nonattainment.

**RESPONSE:** See our response to Issue 1.1.B and Issue 27, generally.

**COMMENTER: Competitive Enterprise Institute (IV-G-73)**

**CEI COMMENT A:** The proposed rule is unnecessary and will increase ozone in a number of areas as indicated by weekday/weekend comparisons. CEI provides a detailed discussion and concludes that ozone levels may rise in 14 areas as a result of the Tier 2 rulemaking. CEI also claims that the grid cell size in the OTAG modeling system is too coarse to address the issue of NO<sub>x</sub> disbenefits and that the raw input data to the Abt analysis shows only two counties above the NAAQS. CEI applies the Empirical Kinetic Modeling Approach using the observed weekday/weekend difference data contained in studies by Altshuler, et al., and Vukovich, et al.

**RESPONSE:** See our response to Issues 1.2, 27.1.H, and 27.4.B-27.4.F.

The commenter has misunderstood the role of the “Abt Report” placed in the docket at the time of proposal. The benefits estimates do not bear on the legal basis for the rule. The analysis documented in the Abt report was performed only to make an initial estimate of the benefits of the proposed program. These benefits depend on the change in ozone level for every day of the ozone season, but not on the absolute ozone concentrations. Therefore, inaccuracies in the prediction of the absolute ozone concentration were not a concern. The fact that only 2 counties outside California had base case peak ozone values above the 1-hour NAAQS in the draft benefits analysis is not material to our final action on the Tier 2 rule, because we intentionally used a modeling approach for this benefits analysis that was not intended to be predictive of the attainment status of individual areas, with the intention of revisiting the benefits analysis after proposal in order to respond to public comments and to make the inventory assumptions consistent with the ozone modeling used for attainment predictions.

The proposed determinations regarding residual nonattainment and the need for additional emission reductions in order to attain and maintain were based on the SIP Call ozone modeling with the “OTAG modeling system.” A final round of modeling to determine residual nonattainment has been completed, with improvements described in the preamble, RIA, and technical support document. This modeling, considered along with local ozone modeling, shows a broad need for additional emission reductions in order to attain and maintain. Moreover, we are not counting several areas as “certain or highly likely” to need additional reductions even though our own modeling shows them to have exceedances in 2007, because of local modeling that shows them to attain in 2007.

Nevertheless, we have examined the original (but since revised) Abt modeling more closely. CEI correctly states that the end result of the ozone modeling used as input to the benefits assessment by Abt was that only 2 non-California counties had predicted peak ozone values above the standard level, and that the change in the peak level due to Tier 2/Sulfur is not large enough to bring the counties below the standard level. The summary table below confirms these observations. However, the Abt data do not support CEI's claim of widespread increases in ozone. As shown in the summary table below, only 0.6% (19 out of 3053) of the non-California counties are estimated to experience an increase in peak ozone levels as a result of the proposed Tier 2/Sulfur rule. Further, the increase in the peak level ranges from 0.1 ppb to 4.5 ppb, with an average among the counties of 0.98 ppb. Only five counties are predicted to experience an increase above that average, including Broward Co. and Dade Co. FL (Miami area), and Denver Co., Jefferson Co., and Douglas Co. CO (Denver area). Finally, since the Abt analysis for the proposal was completed, we have reconsidered and changed one aspect of the Abt methodology for estimating ozone levels in areas without ozone monitors, which tended to produce predictions of ozone increase in areas where the ozone modeling itself did not indicate any disbenefit from NO<sub>x</sub> reductions. If the new approach had been used in the original Abt analysis, it is likely that fewer than 19 counties would have been predicted to have an ozone increase. This revision in our methodology is addressed more completely in our response to Issue 27.4.B.2-.3.

**Summary of 2010 CAA Baseline UAMV-Derived & Interpolated County-Level  
Ozone Results: Input to Benefits Analysis**

	<b>Non-CA Counties</b>	<b>Ave High (ppb)</b>	<b>Ave Chg in High (ppb)</b>
Count >124 ppb	2	137.6	0.35
Count >117.8 ppb (-5%) <124 ppb	5	119.3	2.84
Count >111.6 ppb (-10%) <124ppb	16	115.7	2.54
Average Change (ppb)	2.79	3053 counties	
Average Increase (ppb)	0.98	19 counties	
Average Decrease (ppb)	2.81	3034 counties	

Table footnote: This is a summary of the data used to generate Exhibits A-14 through A-21 in the Abt report "Tier II Proposed Rule Air Quality Estimation, Selected Health and Welfare Benefits Methods, and Benefit Analysis Results."

CEI has also performed a simple and scientifically insupportable analysis in an attempt to show that there will be ozone increases which will likely push 12 of 14 areas into nonattainment as a result of the NOX reductions from the Tier 2/Gasoline Sulfur program. There are several flaws in this analysis:

1. CEI uses the base case ozone 2010 peak value from the Abt analysis done at the proposal stage. This analysis was not intended to provide this type of information, and has been replaced by new modeling in any case.
2. CEI derives a range for the amount of ozone increase per unit of NOX reduction. One end of this range comes from weekday/weekend comparisons in a few of the 14 areas, but as we explain in the response to issue 27.1.H we do not consider such comparisons to be scientifically sound at this point in their development. It certainly is not established that comparisons in one city can be used to predict ozone changes in another.
3. The other end of the range comes from an EKMA diagram developed for Washington, DC in particular. Such an EKMA diagram is based on very simple assumptions and representations of physical processes, even for the city for which it is developed. Using it even for Washington, DC will give less reliable results than will full airshed modeling of the type we have done for the final rule. Using it for other areas is not supportable.

**CEI COMMENT B:** EPA erroneously created and used a new method for evaluating the effects of Tier 2/Sulfur controls on attainment with the ozone NAAQS. Under this new exceedance method, EPA's claim that the proposed program would reduce the number of ozone exceedances in non-attainment areas, is flawed since the number of exceedances at all the monitors in an urban area does not correspond with the determination of attainment.

**RESPONSE:** See our response to Issues 27.4.Q and 27.4.E.

**CEI COMMENT C:** EPA makes several errors in its application of the "rollback method" and as a result, the conclusion that 10 areas will not be in attainment with the ozone NAAQS in 2007 is incorrect. EPA has made errors in associating monitoring sites with non-attainment areas. In addition, the use of data from 1995-97 is biased since two years of these three are considered hot weather years. Data from 1996-98 should have been used instead. CEI refers to the potential revision to the 1-hour standard to use the second highest rather than the fourth highest value over three years, which would mitigate the effect of hot year observations.

**RESPONSE:** See our response to 27.4.E, in which we thoroughly discuss other comments regarding the rollback and exceedance methods.

The Competitive Enterprise Institute states that the 1996-1998 period should have been used instead of the 1995-1997 period in applying the rollback analysis. As explained elsewhere in the preamble and in the response to Issue 27.4.E, we do not consider the rollback method to be appropriate as the sole or even primary method of predicting future nonattainment.

In a hypothetical rollback analysis described in our response to Issue 27.4.E and mentioned as well in the preamble, we did use the higher of the design values from the two periods, to give greater assurance that a period of meteorology that is adverse to ozone formation was not propagated into the prediction of future ozone design value. This element of conservativeness is appropriate in light of the tendency of rollback to underestimate future ozone for other reasons, as explained in the response to Issue 27.4.E.

The Technical Support Document contains two lists of by-county predictions of 2007 design values from this hypothetical rollback analysis, one list for each of the two period-specific design values. Ten MSAs or CMSAs are predicted to violate the NAAQS regardless of which period is used: Houston, New York City, Atlanta, Baton Rouge, Dallas, Philadelphia, Beaumont-Port Arthur, Hartford, Longview, and New London. Two do so only based on 1996-1998: Sheboygan and Chicago. Three violate only based on 1995-1997: Grand Rapids, Houma, and Baltimore-Washington. Either single-period list (13 areas based on 1995-1997 or 12 areas based on 1996-1998) is sufficiently large and geographically diverse to support the determination that additional emission reductions are needed overall in order to attain and maintain the ozone NAAQS. In addition, there are three rural counties in nonattainment in 2007 in this hypothetical rollback analysis, one regardless of the period used for design values and two if 1995-1997 is used. Thus, while we believe it is appropriate to use the higher of the two design values, we would make the same determinations based on either period alone.

The comment by the Competitive Enterprise Institute regarding the alleged intention by EPA to change the form of the 1-hour ozone NAAQS is completely irrelevant, since the NAAQS was in fact not changed to use the average of three second-high values.

Regarding monitoring sites, EPA consistently matched monitors with the metropolitan statistical area (MSA) or consolidated metropolitan statistical area (CMSA) in which each was located, and reported other, non-MSA counties separately even if downwind of an MSA or CMSA. While, nonattainment area boundaries are not perfectly coincident with MSA/CMSA boundaries, a fact that was noted in the second supplemental proposal, it is generally true that the great majority of an MSA/CMSA is designated nonattainment if any part of it is so designated. The method used to tabulate areas is not important to our determinations on the need for additional emission reductions in order to attain and maintain. If we had used designated nonattainment area boundaries and populations, it



would not have resulted in a different picture of the scope of the residual nonattainment problem.

**COMMENTER: General Motors (IV-G-75) [and comments from AAM (IV-G-139)]**

**GM/AAM COMMENT A:** EPA's proposed reinstatement of 1-hour ozone std does not support the determination that Tier 2 is necessary to attain or maintain a NAAQS. GM reiterated their concern that EPA's earlier supplemental notice overpredicts the extent of the ozone problem, as supported by analyses performed by AIR and ENVIRON and cites to additional analyses performed by AIR, which suggest that the second supplemental notice also substantially overpredicts the magnitude of the nation's ozone problems in both 1995-1997 and 2007. The overprediction bias results from three different modeling errors: reliance on the exceedance model, use of unrealistic assumptions, and use of unverified modeling techniques. GM provides significant discussion and detail on these issues and presents specific data that illustrates the extent to which ozone levels are overestimated by EPA. GM also provides a number of recommendations to improve the modeling methodologies such as use of the more reliable rollback method instead of the exceedance method, use of more representative meteorological conditions (i.e. the 1988 episode is too extreme and should not be used), and adherence to all eight steps as outlined in EPA's May 1999 Draft Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS. GM concludes that the Tier 2 standards are unnecessary since the requirements included in the proposal to reinstate the 1-hour standard are sufficient to address ozone non-attainment concerns in the context of this standard.

**RESPONSE:** See our response to Issues 27.4.E.

With respect to the 1988 episode, contrary to the commenters' understanding these episode days were used in the analysis presented in all of the three federal register notices. They were not an addition for only the October 27 supplemental notice. However, EPA notes that the episode is not used in the final modeling upon which the rule is based, as all episode days used in the final modeling for eastern states are from 1995.

The only step of the eight steps cited by GM and the Alliance which EPA did not complete in the course of this modeling was the preparation of a protocol document prior to initiation of the modeling. However, the list cited by the commenters is from a draft EPA guidance document for 8-hour ozone modeling by state air agencies, which is a very different context than EPA's own regulatory analysis. The development of a modeling/analysis protocol is an important distinct step in the SIP context because it can avoid misunderstandings and errors that could make later EPA approval of the modeling impossible. The type of information that would be contained in a state modeling protocol is contained in the Technical Support Document for the ozone modeling and the final RIA.

While EPA expects to reinstate the 1-hour ozone NAAQS shortly after promulgation of the Tier 2/Sulfur rule, this reinstatement will not reduce the need for additional emission reductions under CAA section 202(i). As explained in our response to Issue 27.4.C, new emission reduction measures which states might in the future adopt to meet the overarching requirement to demonstrate attainment are not properly part of the baseline for determining the need for additional emission reductions under 202(i).

**GM/AAM COMMENT B:** EPA has not provided sufficient opportunity for comment on the extensive amount of material added to the docket on November 9, 1999 and has not submitted to the docket all the necessary documentation to support their analyses and

conclusions.

**RESPONSE:** EPA disagrees, and believes interested parties have been provided sufficient opportunity to meaningfully review and comment on this material. In addition to the time provided to commenters, the material provided to the docket is the kind of material discussed in the preceding notice and in general differs from prior material in various details but does not differ significantly in the type or nature of the information, compared to that previously available for comment. EPA has received and considered several comments on this material. EPA believes that the information and documentation provided in the materials and elsewhere adequately support the agency's analyses and conclusions.

See also our response to Issue 29.E

**GM/AAM COMMENT C:** EPA's new modeling estimates as summarized in a November 3, 1999 memorandum (Lorang Memo), overestimate base case light duty emissions. More specifically, the new modeling has several flaws: use of multiplicative adjustments to MOBILE5B inventories, use of the larger database of information on 0.4 NO<sub>x</sub> vehicles, underestimation of the benefits of OBD for Tier 1 and NLEV vehicles, overestimation of LDT emission rates, and compounding errors resulting from overestimated VMT growth that exaggerate the 'no control' inventories for LDTs. GM/AAM note that EPA could have developed a new version of MOBILE that would have made the shortcut of applying multiplicative adjustments to MOBILE5 unnecessary. GM/AAM provide detailed discussion on each of these issues.

**RESPONSE:** The GM/Alliance comments state that "A modified MOBILE5b model that incorporates a limited number of MOBILE6 features could easily be constructed and would give much more reliable emissions estimates". GM and the Alliance are presumably referring to the approach used by GM's, Air Improvement Resource, Inc., in developing their ozone modeling assessment. Our analysis of this approach indicates significant flaws in the AIR modeling methodology, precisely because of their use of a modified MOBILE5b model in EMS-95.<sup>65</sup> The inclusion of a limited "modified MOBILE5b" model in EMS-95 produces interactions between the modified inputs and MOBILE5b correction factors that are not representative of either MOBILE5 or MOBILE6. For example, the inclusion of the AIR Tier 2 Model in EMS-95 resulted in MOBILE5b I/M credits being applied to the modified "no I/M" emission rates in the AIR model. Our assessment indicates that this approach resulted in negative deterioration rates for both HC and NOX.<sup>66</sup> We do not consider modeling which predicts that vehicle emissions will decrease with age to be "more reliable".

The approach used for generating emissions inventories in our final rule air quality analysis was designed to avoid the magnitude of errors which results when limited updates to modeling inputs are mingled directly with MOBILE5b correction factors, as advocated by GM and the Alliance. It is more representative of MOBILE6 results to adjust MOBILE5b results with correction factors developed by comparing output from a limited MOBILE6 model (reflecting planned MOBILE6 inputs including emission rates with and without I/M,

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<sup>65</sup>

"Quantification of Inventory Modeling Errors in the GM Air Quality Analysis", Memorandum from John Koupal to Docket A-97-10

<sup>66</sup>

"Comparison of EPA, ARB and AIR Emission Rates", Memorandum from John Koupal to Docket A-97-10

LEV sulfur effects and off-cycle emissions) with output from MOBILE5b. In this way, differences between MOBILE5b and MOBILE6 are more properly accounted for. For example, we estimate that MOBILE6 will result in lower percent reductions for I/M programs than MOBILE5b. This is reflected in our MOBILE5-to-MOBILE6 multiplicative adjustment factors, which are higher for I/M cases than for non-I/M cases, thereby accounting for decreasing I/M benefit between MOBILE5 and MOBILE6.<sup>67</sup> Not accounting for this difference in I/M benefit between the two models would result in the type of error discussed above.

As stated in the GM/Alliance comments, our modeling approach applied MOBILE5-to-MOBILE6 adjustment factors developed at a single speed (24.6 mph) and temperature (75°) to all speeds, roadway types and temperatures. MOBILE6 will use the same temperature correction factors as MOBILE5,<sup>68</sup> and hence our methodology is appropriate as it carries through the MOBILE5 temperature corrections to the MOBILE6 results. On the issue of speed and roadway type, subsequent updates to our Tier 2 Model indicate that our approach to modeling these elements in the air quality analysis resulted in a significant underestimation of both HC and NOX emissions. HC and NOX speed correction factors in MOBILE5 are significantly smaller than those planned for MOBILE6, particularly at speeds above 40 mph and below 20 mph.<sup>69</sup> The development of MOBILE5-to-MOBILE6 adjustment factors at 24.6 mph served to dampen the difference between the speed and roadway effects of the two models. A full accounting for speed and roadway type would only serve to increase our estimates of NOX and HC emissions. This is exemplified in our updated Tier 2 Model results, which estimates significantly higher NOX and VOC emissions than predicted in our air quality modeling.<sup>70</sup>

Regarding LDT emission rates, OBD benefits and the inclusion of auto industry data on 0.4 g/mi NOX vehicles, our responses are contained under Issues 27.4.K, 27.4.H.1, and 27.4.J. Our discussion of VMT issues can be found under Issue 40.E below, and Issue 27.4 (N).

**GM/AAM COMMENT D:** EPA must consider carefully the effect of adding heavy duty off-cycle NO<sub>x</sub> emission to its modeling. The emission reduction associated with the control of heavy-duty off-cycle NO<sub>x</sub> will add to the emission reductions in other vehicle categories and will result in substantially greater overall emissions reductions between the present levels and the 2007 base case. Therefore, it can be assumed that even greater ozone reductions will be achieved in the base case than as compared to prior EPA modeling. If the modeling is performed correctly using the rollback method, it will show less need for Tier 2.

**RESPONSE:** We incorporated the defeat device and settlement decree effects in our revised emission inventories and air quality modeling. Thus, our revised inventories reflect the excess NOX emissions due to defeat devices that will occur in our base year, 2007,

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<sup>67</sup>“Development of On-Highway Inventory Adjustment Factors Used in the Tier 2 Final Rule Air Quality Analysis”, Memorandum from John Koupal to Docket A-97-10.

<sup>68</sup>Glover and Brzezinski, “Exhaust Emission Temperature Corrections Factors for MOBILE6”, Draft MOBILE6 Report M6.STE.004, EPA Report EPA420-P-99-001, January 1999

<sup>69</sup>Brzezinski, et al. “Facility-Specific Speed Correction Factors”, Draft MOBILE6 Report M6.SPD.002, EPA Report EPA420-P-99-002

<sup>70</sup>“Development of Light-Duty Emission Inventory Estimates in the Final Rulemaking for Tier 2 and Sulfur Standards”, Memorandum from John Koupal to Docket A-97-10.

and 2030. These inventories account for the gradual elimination of the excess NOX emissions as a result of the settlement decrees. Inclusion of the defeat device and settlement effects improves the accuracy of the predictions of ozone concentrations in each year modeled and the accuracy of the changes from one year to another, as the commenters note.

See our response to Issue 27.4.E regarding the exceedance method versus the rollback method. While we consider the rollback method to be inappropriate when used as the sole or even primary method of predicting nonattainment based on concentration predictions from the ozone modeling, even the rollback method predicts a broad residual nonattainment problem involving 15 metropolitan areas, 3 other counties, and a population nearly 56 million. This confirms that the NOX and VOC emission reductions from Tier 2 will be needed to help areas attain and maintain the NAAQS.

**GM/AAM COMMENT E:** The extension of the time horizon of the analysis to 2030 reduces the reliability of the model. This assertion is supported by EPA's June 1996 guidance for 1-hour attainment demonstrations. GM/AAM cite to several assumptions used by EPA pertaining to population growth, VMT growth, VMT distribution, and non-vehicle controls and concludes that the resulting estimates of 2030 concentrations are unrealistic. In light of the claimed uncertainty regarding growth factors and therefore also ozone concentrations in future years, GM/AAM urge EPA to provide for a mid-course review of the Tier 2/Sulfur program, citing that EPA recommends that states conduct a mid-course review of their own progress towards attainment.

**RESPONSE:** The commenters continue to claim that VMT growth projections used in this analysis are "unsupportable" without providing any additional evidence other than referring to Department of Energy (DOE) growth estimates. As described in detail in the response to comment 27.4.N, the estimate of future VMT that we have used for the final rule analysis is actually quite conservative compared to historical growth rates. It is also only slightly higher than the DOE estimate the commenter points to, which in turn, is based on a model that historically has substantially under-predicted VMT growth.

The commenters also say that EPA used a population growth rate of 1.3% per year, which they believe is too high. We in fact did not use this growth rate, which appeared in part of our modeling documentation in error.

Our benefits analysis used the Bureau of Economic Analysis (BEA) estimates of population growth for states and metropolitan areas (Bureau of Economic Analysis, 1995). Growth rate estimates based on the BEA data were applied to 1990 county level population statistics for all U.S. counties, collected by the U.S. Census Bureau. BEA estimates were used in the benefits analysis to ensure consistency with spatial allocation of projected increases in vehicle miles traveled (VMT) used to estimate baseline vehicle emissions and reductions in vehicle emissions. The spatial dependence of the VMT projections was based in part on population growth estimated using the BEA population estimates. GM and AAM state that these area-specific growth rates correspond to a national population growth rate of 1.3 percent per year, and they contrast this to a lower estimate from the Bureau of Census projections. Upon investigation, we have concluded that GM and AAM found this figure of 1.3 percent in Table III-1 of the docketed document "Procedures for Developing Base Year and Future Year Mass and Modeling Inventories for the Tier 2 Final Rulemaking." This table was intended to represent the aggregate national growth implied by the area-specific growth estimates published by BEA, merely for illustration. However, we have determined that the population growth value calculated for display in this table was calculated incorrectly from the growth estimates for individual areas actually used in the air quality and benefits analysis. BEA's web site (<http://itre.ncsu.edu/cte/Indicators.PDF>) and

<http://www.bea.doc.gov/bea/regional/articles/rprj2045/tableS.html> ) reports that the actual national population growth rate determined by summing the area-specific BEA growth estimates is 0.8 percent per year, consistent with the Bureau of the Census projection cited by GM and AAM. We have investigated and verified that the incorrect value of 1.3 percent was not used in any way to calculate VMT or population growth for any areas; the error was limited to this table, which was for illustration only. The actual ozone modeling and economic analysis used area-specific growth projections, and were done correctly and consistently with the lower value for national population growth. A corrected version of the table is in the docket<sup>71</sup>

In any case, the emission projections and ozone concentration predictions for 2030 are not an essential element of the determinations that support the promulgation of the Tier 2/sulfur program. The predictions of residual nonattainment in 2007 are sufficient to support those determinations.

The commenters claim that we assume no change in spatial allocation of VMT in future years. As described in the supporting documentation, the method used to allocate national VMT to the county level is scaled to Bureau of Economic Analysis projections of local population growth. In other words, counties with higher population growth will have higher VMT growth. As a result, the spatial allocation of VMT at the county level does change over time.

The commenters claim that our assumption of no new controls on non-vehicle sources after 2007 is unrealistic. Our baseline control scenario for our ozone modeling is not intended to be a prediction of all emission controls that will be eventually adopted and in place by 2030, nor should it have been. The scenario is instead the proper baseline under CAA section 202(i), including only emission reduction measures that have been adopted or committed and excluding measures which the CAA contemplates will be compared to Tier 2 standards based on relative cost-effectiveness. Our analysis is based on a realistic assessment of the emissions reductions resulting from controls that are properly considered part of the baseline for the determinations under CAA section 202(i) regarding the need for further emission reductions. Our complete response to the issue of the baseline control program is given under Issue 27.4.C.

Our recommendations (in some cases a proposed requirement) for mid-course progress reviews by states focus on the period of about 2003 to 2005, after all planned emission reductions (except for fleet turnover) have been implemented and are reflected in air quality measurements. The reviews are intended to check whether additional controls not yet adopted by the states may be needed to achieve attainment by 2005 or 2007. GM/AAM propose a mid-course review in roughly the same time frame, but it would be a review before full compliance with the adopted standards, claimed to be necessary in these comments based on alleged uncertainties regarding VMT growth between 2007 and 2030. The EPA recommendation to states is so different in context and substance that it has no bearing on the merits of the GM/Alliance proposal. Our full response to the proposal for a mid-course review, and our plans for such a review, are given in our response to Issue 28.

**GM/AAM COMMENT F:** EPA's analysis of real world observations confirm that HC controls would be effective and supports the concern that the EPA regional modeling has a NO<sub>x</sub>

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<sup>71</sup>"Corrections to Table III-1 in "Procedures for Developing Base Year and Future Year Mass and Modeling Inventories for the Tier 2 Final Rulemaking", Memorandum from Gary Dolce to Docket A-97-10, Dec. 20, 1999.

bias. EPA's analysis shows that the ozone formation process in 1996 - 1998 is much more complex than the Agency's earlier NO<sub>x</sub>-limited position would predict. Therefore, EPA should analyze more fully the observational modeling and the geographic effectiveness of NO<sub>x</sub> versus HC controls in 2007 and beyond and should subject its new regional modeling to a performance evaluation, including weekday/weekend ozone differences in the modeling domain. EPA should also perform sensitivity analyses to evaluate the effect of horizontal grid size and variations in biogenics and should take advantage of changes to the meteorological episodes that will be modeled in the eastern domain.

[In the context of this issue, GM/AAM cite to J. David Mobley, U.S. EPA Office of Air Quality Planning and Standards, "Corroborative Evidence for Pursuing Effective Ozone Precursor Emission Reductions in the U.S.," October 6, 1999 and David Guinnup, U.S. EPA Office of Air Quality Planning and Standards, "Draft Journal Article," November 18, 1999 (both were placed in the docket on November 9, 1999)]

**RESPONSE:** Ozone modeling methods, results, and implications are addressed in our responses to Issues 27.1.H and 27.4.B through 27.4.G. and in the Technical Support Document, including the issue of possible ozone increases due to NO<sub>x</sub> decreases.

GM cites the conclusion of the J. David Mobley memo ("Corroborative Evidence . . .") that in most areas both VOC and NO<sub>x</sub> reductions will lead to ozone reductions, as if it were evidence contrary to some EPA assumption that VOC reductions do not reduce ozone, or as if it were in contradiction to some broad tendency of the EPA modeling system. In fact, the conclusions of this memo are consistent with EPA's position on the benefits of VOC reductions and with our final modeling system's predictions of the effects of VOC reductions. EPA has never disputed that VOC reductions reduce ozone. We agree VOC controls are beneficial. This is supported by our actions on the 1-hour ozone attainment demonstrations which contain substantial VOC controls and show local VOC reductions in combination with NO<sub>x</sub> reductions will help many areas achieve attainment of the ozone NAAQS. Working with these demonstrations we feel the Tier 2 program will compliment the States' efforts and provide progress towards attainment. EPA has also concluded that NO<sub>x</sub> reductions are also broadly beneficial, with ozone increases from NO<sub>x</sub> reductions limited in size and geographic scope. The Mobley memo is thus consistent with long-standing EPA positions.

GM and AAM quote selectively from the "draft journal article" by David Guinnup and other authors. (The 11/18/1999 date given for this paper in the docket index is not its correct date of composition; the paper was actually drafted about one year ago.) The paper is based on only four cities and eight weekends, and has not been accepted for publication. As such, our assessment (explained in our response to Issue 27.1.H) that weekend/weekday comparisons are not robust enough to allow certainty in their conclusions applies to this paper. The authors themselves say only that the possibility of local disbenefit effects is suggested by the limited data. The authors do not say that the analysis indicates that disbenefits occur in other areas, or that they would occur in the future under different emission conditions.

Regarding the statement about evaluation of air quality models, the authors do say that air quality models should be challenged to reproduce weekday/weekend effects. However, they also say that emission inventory differences must be quantified first. They do not propose that current state-of-the-art modeling systems should not be used meanwhile. In our ozone modeling for Tier 2, we have used the best modeling system available to us for the needed national analysis of residual nonattainment.

**COMMENTS: American Petroleum Institute (IV-G-84)**

**API COMMENT A:** EPA can base the Tier 2 and sulfur control requirements only on the existing 1-hour ozone and PM10 standards. Under those standards, the requirements are excessive. The extensive modeling in the draft RIA does not support EPA's contention in the two supplemental notices that there is a widespread 1-hour ozone nonattainment problem. For the first supplemental notice, API cannot comment on the accuracy of EPA's assertion that the "proposed Tier 2/sulfur program would reduce the number and severity of ozone exceedances in areas currently designated non-attainment under the existing 1-hour ozone standard" since there is a lack of supporting documentation. The extensive modeling and analysis in the RIA does not support this assertion. EPA should make the appropriate analyses (i.e. the "preliminary analyses" as cited by EPA) and modeling available for comment.

**RESPONSE:** For commenter's concerns related to the alleged lack of supporting data and preliminary analyses for the First Supplemental Notice, see our response to Issue 29.E. For our response related to the issue concerning "preliminary analyses," see our response to Issue 27.4.Q. For the commenter's general comment that the modeling data do not support the degree of emission reductions required under the Tier 2/Gasoline Sulfur Programs, see generally our responses to the comments under Issue 27.4. Regarding opportunity for review and comment, see our response to GM/AAM comment B above.

**API COMMENT B:** The commenter points out that the second supplemental notice acknowledges errors in the analysis presented in the first supplemental notice.

**RESPONSE:** The errors pointed out in the second supplemental notice involved only the matching of the predicted ozone concentration in certain grid cells to metropolitan area names. They did not involve the ozone concentration predictions themselves or any aspect of the ozone modeling system. In analyzing the results of the final ozone modeling, we have taken special care to ensure that every grid cell is matched properly.

**API COMMENT C:** API notes that the areas in Texas and Milwaukee should not be used to justify the proposed Tier 2/Sulfur rule.

**RESPONSE:** The commenter refers to Beaumont-Port Arthur, TX. In the modeling for the proposal, this area did not have any predicted exceedances, a fact that EPA made clear in the October 27, 1999 supplemental notice, which also explained why EPA considered it to be an area that requires further reductions to attain and maintain the ozone standard. In the final modeling, this area continues to show no exceedances during the episodes used, since the selected episodes do not represent certain ozone conducive conditions that do occur in the area, namely conditions that cause the transport of ozone from the Houston area to the Beaumont-Port Arthur area. Local ozone modeling placed in the docket and summarized in the RIA shows that the area does require additional emission reductions when analyzed using episodes which do reflect this transport situation.

In the modeling for the proposal, there actually was no exceedance predicted over the land area of the Milwaukee-Racine CMSA. The second supplemental notice corrected an implication in the first supplemental notice that there had been such an exceedance over land. However, an exceedance was predicted nearby over Lake Michigan. Given the difficulty in modeling near-shoreline wind fields with a coarse grid model, in the second supplemental notice we considered this over-water exceedance to be indicative of ozone concentrations that might actually occur over the Milwaukee-Racine CMSA land area. This issue is now moot, however, because in the final modeling, there is at least one exceedance over the land area itself. In any case, EPA considers the Chicago and Milwaukee areas to be one airshed, in which contributions to emissions and ozone

formation are shared, such that an exceedance in either area, or downwind over Lake Michigan or western Michigan, indicates a need for additional emission reductions in both areas. It is our understanding that the states of Wisconsin and Illinois share this view, as reflected in their cooperation in a single ozone modeling and SIP development program for both areas.

**API COMMENT D:** EPA should have used a 3-year period consistently to represent historical design values.

**RESPONSE:** See our response to CEI comment C, above, regarding the selection of a 3-year period in the context of rollback analysis.

The historical design value's role in the exceedance method is to screen out predictions of 2007 exceedances where a history of consistently clean air makes those predictions suspect as being due to model error. It is appropriate to retain areas based on either period, because both represent historical and possible future meteorological conditions. In any case, if we had selected only a single period it, would not have affected our determination that further emission reductions are necessary for attainment and maintenance. Our lists of areas that are certain or highly likely to need further emission reductions would not have been shortened enough to have changed that determination. The following table summarizes the period-dependence of the design values for the areas in question.



**Table 40-1**  
**Period Dependence of Design Values for Areas Listed in Table III.B-1**  
**of the Tier 2/Sulfur Final Rule Preamble**

<b>Areas with 1995-1997 design value above 124 ppb</b>	<b>Areas with 1996-1998 design value above 124 ppb</b>
Atlanta, GA MSA	Atlanta, GA MSA
Barnstable-Yarmouth, MA MSA	
Baton Rouge, LA MSA	Baton Rouge, LA MSA
Beaumont-Port Arthur, TX MSA	Beaumont-Port Arthur, TX MSA
Birmingham, AL MSA	Birmingham, AL MSA
Boston-Worcester-Lawrence, MA-NH-ME-CT CMSA	
Cincinnati-Hamilton, OH-KY-IN CMSA	Charlotte-Gastonia-Rock Hill, NC-SC MSA
Dallas-Fort Worth, TX CMSA	Dallas-Fort Worth, TX CMSA
Houma, LA MSA	
Houston-Galveston-Brazoria, TX CMSA	Houston-Galveston-Brazoria, TX CMSA
	Huntington-Ashland, WV-KY-OH MSA
	Indianapolis, IN MSA
Los Angeles-Riverside-San Bernardino CA CMSA	Los Angeles-Riverside-San Bernardino CA CMSA
Louisville, KY-IN MSA	Louisville, KY-IN MSA
Macon, GA MSA	Macon, GA MSA
Memphis, TN-AR-MS MSA	Memphis, TN-AR-MS MSA
	Nashville, TN MSA
New York-Northern New Jersey-Long Island, NY-NJ-CT-PA CMSA	New York-Northern New Jersey-Long Island, NY-NJ-CT-PA CMSA
Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD CMSA	Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD CMSA
Pittsburgh, PA MSA	
	Portland-Salem, OR-WA CMSA
Providence-Fall River-Warwick, RI-MA MSA	
	Richmond-Petersburg, VA MSA
St. Louis, MO-IL MSA	St. Louis, MO-IL MSA
Washington-Baltimore, DC-MD-VA-WV CMSA	Washington-Baltimore, DC-MD-VA-WV CMSA

**API COMMENT E:** In publishing the second supplemental notice, EPA fails to meet the requirements of Section 307(d) of the CAA, which requires the agency to include in the docket on the date of publication of the proposed rule the factual data, methodologies, legal interpretations, and policy considerations on which the proposed rule is based.

**RESPONSE:** EPA did include in the docket the data, information, and documents on which the supplemental notice relied. Whether or not the requirements of section 307(d)(3) apply to the Supplemental notice, they in fact were met. For example, the new modeling followed methods clearly articulated in the NPRM and the two supplemental notices, but was modified to address comments received on the first round of modeling. These modifications do not raise new issues. The only mobile source emissions modeling aspects not raised as an issue for comment by the first proposal are the use of newer estimates of emissions from non-road engines and the

treatment of heavy-duty diesel NO<sub>x</sub> defeat devices, and 28 days elapsed between when documents on these aspects were placed in the docket and when AAM submitted this set of comments. Moreover, the NONROAD model used for the estimates of non-road engine emissions had been available for technical review for months previously. The thorough comments received on all other emission and ozone modeling issues demonstrates that there was sufficient opportunity to comment. See also our response to GM/AAM Comment B, above.

**API COMMENT F:** Section 307(d) also requires EPA to provide the public with an opportunity for oral comment on the proposal and to accept written comment for 30 days after the public hearing. EPA provided no opportunity for an oral hearing on the Second Supplemental Notice.

**RESPONSE:** EPA did provide the commenter and other interested parties with an opportunity for the oral presentation of data, views or arguments, in compliance with section 307(d)(5). EPA provided such an opportunity of four different occasions. EPA was not required to provide an additional opportunity after the Second Supplemental Notice. See also our response to GM/AAM Comment B, above.

**API COMMENT G:** API references OTAG modeling that it says supports their position that fuel changes would not have a significant impact on air quality.

**RESPONSE:** For the OTAG modeling issue, see our response to Issue 27.4.V.

**COMMENTS: NPRA (IV-G-103)**

**COMMENT:** The Tier 2/Sulfur proposal is excessive in the context of the 1-hour standard and PM-10 standard. EPA has yet to demonstrate that the proposed sulfur levels meet the CAA criteria of air quality need on a national basis. Instead, NPRA advocates a regional approach to sulfur reductions. NPRA asserts that the list of areas in the two Supplemental Notices provides further rationale to consider a regional approach because none of the cities are in the western region of API/NPRA's regional proposal. NPRA also notes that OTAG modeling runs demonstrate that the air quality benefits of gasoline sulfur reduction are small relative to the NAAQS standard and EPA's estimated reductions are uncertain given the accuracy of the models.

**RESPONSE:** For issues concerning the need for the proposal, see our response to Issue 1.2 and Issue 27 generally. For the OTAG modeling issue, see our response to Issue 27.4.V. For our response to the regional proposal, see our response to Issue 13.D.

**COMMENTS: PA DEP (IV-G-104)**

**COMMENT:** PA DEP reiterates support for the proposed Tier 2/sulfur standards and emphasizes the importance of the reductions from Tier 2 in assisting PA achieve attainment for all areas.

**RESPONSE:** See our response to Issue 1.1.B. and Issue 27, generally.

**COMMENTS: IL EPA (IV-G-105)**

**COMMENT:** Supports adoption of Tier 2.

**RESPONSE:** See our response to Issue 1.1.B. and Issue 27, generally.

**ISSUE 41: MISCELLANEOUS NEW ISSUES RECEIVED AFTER CLOSE OF COMMENT PERIOD**

**ISSUE 41A: MISCELLANEOUS NEW VEHICLE ISSUES RECEIVED AFTER CLOSE OF COMMENT PERIOD**

**COMMENT A:** The commenter takes no position on whether EPA should adopt as a final rule the proposed Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements. They are instead concerned that the scientific information upon which EPA makes its decision be complete and accurate, particularly as to whether higher-sulfur content fuel substantially impairs the function of vehicle emission control technology and, if so, whether that impairment is reversible. They feel that they have developed a technology which enhances catalyst efficiency and mitigates the impact of catalyst poisoning by sulfur and that this technology should be acknowledged in the Tier 2 regulations. Their technology, referred to as the Litex CDD, is a non-thermal plasma generated by a corona discharge device in the automobile exhaust stream upstream of a three-way catalytic converter. **(Litex, Inc. (IV-G-05), p. 1-2)**

**RESPONSE:** We don't agree with the commenter that a discussion on this technology should be included in the Tier 2 regulations. We have two concerns about the Litex CDD. First, the data provided by Litex is very limited. Only a small fraction of the data was derived on a vehicle over the FTP and US06 cycles and all of this data was for a single sulfur level. The data that they present which indicates some ability to mitigate sulfur's effect on the catalyst was done on a steady-state bench using a pulse flame combustor and small catalyst core samples. EPA and industry have learned over the past several years that results from laboratory and in-use sulfur programs can differ significantly. Our second concern is that this technology is little understood, even by Litex. Therefore, we continue to believe that no technology exists or will exist in the Tier 2 time frame that will mitigate the effect of sulfur on catalyst performance.

**COMMENT B:** The data presented by EPA in the proposed Tier 2 rule on technological feasibility for vehicles is limited and lacks balance. The modifications made to vehicles by EPA and others are very much in doubt, and EPA has not adequately considered the impacts these modifications could have on durability and driveability. **(David Hagen, retired general manager, Engine Division, Ford Motor Co. (IV-G-70))**

**RESPONSE:** Refer to the response for Issue 26.1.1 and 26.1.2 of the Tier 2 Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements: Response to Comments.

**COMMENT C:** The commenter provided EPA with emission data for a prototype 4.5 liter V6 diesel engine tested over the "steady state six mode" emission test cycle using current "federal certification" fuel (<500 ppm sulfur). Although they did not have data for the engine with any aftertreatment devices, they projected what the results would be for aftertreatment devices having a 20 percent efficiency over a 120,000 mile engine lifetime. Based on these results, they argue that the proposed Tier 2 interim standards are not feasible for diesel-powered light-duty trucks in the absence of ultra-low sulfur diesel fuel. **(Navistar International Transportation Corporation (IV-G-62))**

**RESPONSE:** We do not agree with the commenter. The Tier 2 emission standards are chassis-based FTP cycle standards. The data presented to EPA by Navistar were not FTP data, but rather data from a steady state six mode engine bench test. These test cycles

are not comparable. Therefore, the data submitted by Navistar is unusable and does not support their argument that the Tier 2 interim standards are not feasible for diesel-powered light-duty trucks in the absence of ultra-low sulfur diesel fuel.

**ISSUE 41B: MISCELLANEOUS NEW FUEL ISSUES RECEIVED AFTER CLOSE OF COMMENT PERIOD**

**COMMENT:** Comments from National Petrochemical and Refiners Association. (NPRA) (IV-A-10)

**RESPONSE:** Late comments raised in this letter are addressed under Issues 16 J;, 16 T; 16 U; 23.2.1 A. 18, and 23.2.2 C.